



Northeastern University



Ruby Wallau for Northeastern University

Graduate Catalog

2025-2026

Table of Contents

Delivery of Services	21
General Information	22
Governing Boards and Officers of Northeastern	23
University Leadership	25
Accreditation	26
Authorizations	31
Notifications and Disclosures	35
Major CIP Codes	37
Resources	57
Graduate	58
Information for Entering Students	58
Academic Resources	58
Libraries	59
Office of the University Registrar	60
Campus Resources	61
Center for Advancing Teaching and Learning Through Research	61
Disability Resource Center	61
Employer Engagement and Career Design	62
Public Safety	63
University Health and Counseling Services	65
We Care	66
Information for International Students	67
Information Technology Services	68
Off Campus Engagement and Support	69
Financial Information	70
Contact Student Financial Services (SFS)	71
Tuition and Fees	72
Billing and Tuition Adjustments	79
Payment	82
Financial Aid	83
Northeastern University Student Health Plan (NUSHP)	86
Academic Policies and Procedures	87
Academic Integrity Policy	88
Academic Consequences for Violating the University Academic Integrity Policy	91
Accommodations for Students with Disabilities	92
Attendance Requirements	93
Campus Transfer and Campus Location Change	94
Clearing an Academic Deficiency	95
Code of Student Conduct	96
Course Credit Guidelines	112

Course Numbering System	113
Course Substitutions	114
Course Withdrawal	114
Grade Change Policy	114
Grade Table and GPA	115
Graduation Requirements	117
Instructional Methods	119
Leaves of Absence and University Withdrawal	120
Personal Information	123
Requesting and Clearing An Incomplete Grade	123
Retaking Courses	123
Student Bill of Academic Rights and Responsibilities	124
Student Records Privacy	127
Student Responsibility Statement	129
Student Right-to-Know Act	129
Student Time Status	130
University-Sponsored Travel	132
Academic Appeals Policies and Procedures	133
Academic Calendars	136
Audit Policy	136
Cooperative Education	137
Course Credit Sharing	139
Departmental Jurisdiction	140
Dropping a Class	140
Final Examinations and Related Policies on Other Exams	140
Minimum Cumulative GPA	141
Overload Conditions for Graduate Assistants	141
Satisfactory/Unsatisfactory Grading	141
Student Complaints	142
Regulations and Requirements for All Graduate Degree Programs	143
Regulations and Requirements for Graduate Certificate Programs	145
Regulations and Requirements for The Master's Degree	146
Regulations and Requirements for PlusOne Degree Combinations	147
Regulations and Requirements for Professional Doctorate Degree Programs	148
Regulations and Requirements for Certificates of Advanced Graduate Study	150
Regulations and Requirements for Doctor of Philosophy (PhD) Programs	151
Regulations and Requirements for Interdisciplinary Graduate Degree Programs	153
Definitions	154
PhD Programs	155
Experiential PhD (Boston)	157
Interdisciplinary, PhD (Boston)	158
Interdisciplinary, PhD (Portland)	160
University Interdisciplinary Programs	163

Artificial Intelligence, MS (Boston)	164
Complex Network Analysis, MS (Boston)	166
Data Science, MS (Boston)	169
Data Science—Align, MS (Boston)	172
Extended Realities, MS (Boston)	175
Extended Realities, MS (Oakland)	179
Robotics, MS (Boston)	180
Robotics, MS (Seattle)	184
Statistics, MS (Boston)	187
Statistics, MS—Connect (Boston)	189
AI Applications, Graduate Certificate (Boston)	190
AI Applications, Graduate Certificate (Silicon Valley)	191
Product Management, Graduate Certificate (Boston)	192
College of Arts, Media and Design	194
Academic Policies and Procedures	195
General Information	195
Grade Appeal Policy	195
Graduate Student Classification	196
Master's Degree Policies	197
School of Architecture	198
Master of Architecture—One-Year Program (Boston)	198
Master of Architecture—Two-Year Program (Boston)	199
Master of Architecture—Three-Year Program (Boston)	202
Master of Architecture—Three-Year Program—Advanced Degree Entrance (Boston)	205
Sustainable Urban Environments, MDes—One-Year Program (Boston)	209
Sustainable Urban Environments, MDes—Two-Year Program (Boston)	209
Art + Design	210
Experience Design, MFA (Boston)	211
Information Design and Data Visualization, MFA (Boston)	213
Experience Design, MS (Boston)	215
Game Science and Design, MS (Boston)	217
Game Science and Design, MS (Oakland)	219
Information Design and Data Visualization, MS (Boston)	221
Information Design and Data Visualization, MS (Vancouver)	222
Media Innovation and Data Communication, MS (Boston)	223
Experience Design, Graduate Certificate (Boston)	225
Game Experience Design, Graduate Certificate (Boston)	225
Game Science, Graduate Certificate (Boston)	226
Information Design and Visualization, Graduate Certificate (Boston)	227
Product Management, Graduate Certificate (Boston)	192
Communication Studies	228
Media, Technology, and Ethics, MS (Boston)	229
School of Journalism	231

Journalism, MA (Boston)	231
Media Advocacy, MS (Boston)	232
Media Innovation and Data Communication, MS (Boston)	223
Media, Technology, and Ethics, MS (Boston)	229
Interdisciplinary Programs	236
Interdisciplinary Design and Media, PhD (Boston)	237
Network Science, PhD (Boston)	241
Arts Administration and Cultural Entrepreneurship, MS (Boston)	246
Creative Collaboration and Multidisciplinary Design, MS (Boston)	248
Extended Realities, MS (Boston)	175
Extended Realities, MS (Oakland)	179
Urban Planning and Policy, MS (Boston)	254
AI Applications, Graduate Certificate (Boston)	190
Arts Administration, Graduate Certificate (Boston)	259
Cultural Entrepreneurship, Graduate Certificate (Boston)	259
Product Management, Graduate Certificate (Boston)	192
D'Amore-McKim School of Business	262
Master of Science	263
Business Analytics, MS (Boston)	263
Business Analytics, MS (Oakland)	264
Business Analytics—Online, MS	265
Extended Realities, MS (Boston)	175
International Management, MS (Boston)	270
Management, MS (Boston)	271
Management, MS with Major in Fintech Management (Miami)	281
Accounting, MSA (Boston)	282
Accounting and Business Administration, MSAMBA (Boston)	283
Finance, MSF (Boston)	284
Quantitative Finance, MSF (Boston)	285
Quantitative Finance, MSF (Oakland)	286
Master of Business Administration	288
Business Administration, MBA—Full-Time (Boston)	288
Business Administration, MBA—Online	297
Business Administration, MBA—Part-Time (Boston)	298
Dual Degrees	303
Business Administration, MBA—Full-Time / Finance, MSF (Boston)	304
Business Administration, MBA—Part-Time / Finance, MSF (Boston)	304
Law, JD / Accounting and Business Administration, MSAMBA (Boston)	305
Law, JD / Business Administration, MBA—Full-Time (Boston)	305
Law, LL.M. / Business Administration, MBA—Full-Time (Boston)	305
Quantitative Finance, MSF / Business Administration, MBA—Full-Time (Boston)	306
Graduate Certificates	306
Accounting and Financial Decision Making, Graduate Certificate (Boston)	307

AI Applications, Graduate Certificate (Boston)	190
Brand Management, Graduate Certificate (Boston)	308
Business Administration, Graduate Certificate (Boston)	309
Business Administration, Graduate Certificate (Miami)	310
Business Administration, Graduate Certificate—Online	311
Business Analytics, Graduate Certificate (Boston)	312
Business Management for Healthcare, Graduate Certificate (Boston)	312
Corporate Finance, Graduate Certificate (Boston)	313
Corporate Innovation, Graduate Certificate (Boston)	313
Corporate Renewal, Graduate Certificate (Boston)	314
Entrepreneurship, Graduate Certificate (Boston)	315
International Business, Graduate Certificate (Boston)	315
Investments, Graduate Certificate (Boston)	316
Leading People and Organizations, Graduate Certificate (Boston)	316
Marketing, Graduate Certificate (Boston)	317
Marketing Analytics, Graduate Certificate (Boston)	318
Mutual Fund Management, Graduate Certificate (Boston)	318
Product Management, Graduate Certificate (Boston)	192
Supply Chain Management, Graduate Certificate (Boston)	320
Sustainability and Business, Graduate Certificate (Boston)	321
Khoury College of Computer Sciences	322
Academic Policies and Procedures	323
Academic Integrity	323
Academic Probation and Dismissal	324
Attendance Policy	324
Campus Transfer	324
Certificates	325
Course Overload	325
Incomplete Grades	326
Satisfactory/Unsatisfactory (Pass/Fail) Policy	326
Reentry to Program	326
Retaking Courses	326
Transfer of Credit	326
Computer Science	327
Computer Science, PhD (Boston)	329
Network Science, PhD (Boston)	241
Personal Health Informatics, PhD (Boston)	339
Artificial Intelligence, MS (Boston)	164
Artificial Intelligence, MS (Portland)	345
Artificial Intelligence, MS (Seattle)	346
Artificial Intelligence, MS (Silicon Valley)	348
Complex Network Analysis, MS (Boston)	166
Data Science, MS (Boston)	169

Data Science, MS (Portland)	355
Data Science, MS (Silicon Valley)	357
Data Science—Align, MS (Boston)	172
Data Science, MS—Align (Portland)	361
Data Science, MS—Align (Silicon Valley)	364
Extended Realities, MS (Boston)	175
Game Science and Design, MS (Boston)	217
Internet of Things, MS (Boston)	372
Robotics, MS (Boston)	180
Robotics, MS (Seattle)	184
Statistics, MS (Boston)	187
Statistics, MS—Connect (Boston)	189
Computer Science, MSCS (Arlington)	386
Computer Science, MSCS (Boston)	388
Computer Science, MSCS (Miami)	389
Computer Science, MSCS (Oakland)	391
Computer Science, MSCS (Portland)	392
Computer Science, MSCS (Silicon Valley)	394
Computer Science, MSCS (Seattle)	395
Computer Science, MSCS (Vancouver)	398
Computer Science, MSCS—Align (Arlington)	400
Computer Science, MSCS—Align (Boston)	402
Computer Science, MSCS—Align (Miami)	404
Computer Science, MSCS—Align (Oakland)	405
Computer Science, MSCS—Align (Portland)	407
Computer Science, MSCS—Align (Seattle)	409
Computer Science, MSCS—Align (Silicon Valley)	412
Computer Science, MSCS—Align (Vancouver)	413
Computer Science, Graduate Certificate (Boston)	416
Data Analytics, Graduate Certificate (Boston)	416
Inclusive Computer Science Education, Graduate Certificate (Portland)	417
Cybersecurity	417
Cybersecurity, PhD (Boston)	418
Cybersecurity, MS (Arlington)	422
Cybersecurity, MS (Boston)	424
Cybersecurity, MS—Align (Arlington)	426
Cybersecurity, MS—Align (Boston)	428
Cybersecurity, Graduate Certificate (Boston)	429
Interdisciplinary Programs	430
Network Science, PhD (Boston)	241
Personal Health Informatics, PhD (Boston)	339
Data Science, MS (Boston)	169
Extended Realities, MS (Boston)	175

Game Science and Design, MS (Boston)	217
Health Informatics, MS (Boston)	447
Health Informatics, MS (Vancouver)	450
Robotics, MS (Boston)	180
Robotics, MS (Seattle)	184
Data Analytics, Graduate Certificate (Boston)	416
College of Engineering	460
Academic Policies	461
Academic Dismissal Policy	461
Academic Integrity Policy	461
Academic Standing Policy	462
Appeals Policy	462
Attendance Policy	463
Campus Transfer and Location Change	463
Certificate Policies and Procedures	464
Course Registration	466
Course Retake / Course Substitution	466
Course Selection	467
Dissertation Committee	467
Grievance Policy	468
PhD Student Progress and Review	468
Program Completion	469
Reenrollment Policy for Full-time Students	469
Thesis Policy	470
Bioengineering	470
Bioengineering, PhD (Boston)	471
Bioengineering, PhD (Portland)	479
Interdisciplinary Engineering, PhD (Boston)	486
Robotics, MS (Boston)	180
Bioengineering, MSBioE (Boston)	493
Bioengineering, MSBioE—Connect (Boston)	498
Chemical Engineering	499
Chemical Engineering, PhD (Boston)	500
Interdisciplinary Engineering, PhD (Boston)	486
Pharmaceutical Engineering, MS (Boston)	507
Chemical Engineering, MSChE (Boston)	509
Process Safety Engineering, Graduate Certificate (Boston)	514
Civil and Environmental Engineering	514
Civil and Environmental Engineering, PhD (Boston)	516
Interdisciplinary Engineering, PhD (Boston)	486
Climate Science and Engineering, MS (Boston)	520
Engineering and Public Policy, MS (Boston)	523
Sustainability Engineering Leadership, MS (Boston)	525

Civil Engineering with Concentration in Construction Management, MSCivE (Boston)	526
Civil Engineering with Concentration in Data and Systems, MSCivE (Boston)	528
Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering, MSCivE (Boston)	531
Civil Engineering with Concentration in Structures, MSCivE (Boston)	533
Civil Engineering with Concentration in Transportation, MSCivE (Boston)	535
Civil Engineering with Concentration in Water, Environmental, and Coastal Systems, MSCivE (Boston)	537
Environmental Engineering, MSEnVE (Boston)	539
Sustainable Building Systems, MSSBS (Boston)	541
Climate and Engineering, Graduate Certificate (Boston)	543
Sustainability Engineering, Graduate Certificate (Boston)	544
Electrical and Computer Engineering	544
Computer Engineering, PhD (Boston)	546
Cybersecurity, PhD (Boston)	418
Electrical Engineering, PhD (Boston)	551
Electrical Engineering, PhD (Oakland)	553
Interdisciplinary Engineering, PhD (Boston)	486
Applied Physics and Engineering, MS (Boston)	557
Artificial Intelligence, MS (Boston)	164
Data Science, MS (Boston)	169
Extended Realities, MS (Boston)	175
Internet of Things, MS (Boston)	372
Robotics, MS (Boston)	180
Robotics, MS (Seattle)	184
Semiconductor Engineering, MS (Boston)	580
Wireless and Network Engineering, MS (Boston)	583
Electrical and Computer Engineering with Concentration in Communications, Control, and Signal Processing, MSECE (Boston)	585
Electrical and Computer Engineering with Concentration in Computer Systems and Software, MSECE (Boston)	588
Electrical and Computer Engineering with Concentration in Computer Systems and Software, MSECE (Seattle)	590
Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms, MSECE (Boston)	593
Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms, MSECE (Seattle)	596
Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics, MSECE (Boston)	598
Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence, MSECE (Boston)	601
Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence, MSECE (Seattle)	604
Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices, MSECE (Boston)	606
Electrical and Computer Engineering with Concentration in Power Systems, MSECE (Boston)	609
Electrical and Computer Engineering Leadership, MSECEL (Boston)	611
Mechanical and Industrial Engineering	612
Industrial Engineering, PhD (Boston)	614
Interdisciplinary Engineering, PhD (Boston)	486
Mechanical Engineering, PhD (Boston)	619
Advanced and Intelligent Manufacturing, MS (Boston)	622
Artificial Intelligence, MS (Boston)	164
Data Analytics Engineering, MS (Boston)	628

Data Analytics Engineering, MS (Seattle)	631
Data Analytics Engineering, MS (Vancouver)	634
Data Analytics Engineering, MS—Online	637
Human Factors, MS (Boston)	638
Robotics, MS (Boston)	180
Robotics, MS (Seattle)	184
Semiconductor Engineering, MS (Boston)	580
Industrial Engineering, MSIE (Boston)	651
Engineering Management, MSEM (Boston)	655
Engineering Management, MSEM—Online	659
Energy Systems, MSeNeS (Boston)	660
Energy Systems, MSeNeS-Academic Link Program (Boston)	663
Mechanical Engineering with Concentration in General Mechanical Engineering, MSME (Boston)	664
Mechanical Engineering with Concentration in Materials Science, MSME (Boston)	667
Mechanical Engineering with Concentration in Mechanics and Design, MSME (Boston)	669
Mechanical Engineering with Concentration in Mechatronics, MSME (Boston)	672
Mechanical Engineering with Concentration in Thermofluids, MSME (Boston)	675
Operations Research, MSOR (Boston)	677
AI Applications, Graduate Certificate (Boston)	190
Data Analytics Engineering, Graduate Certificate (Boston)	681
Data Analytics Engineering, Graduate Certificate—Online	682
Digital Platforms for Service Innovation, Graduate Certificate (Boston)	682
Energy Systems, Graduate Certificate (Boston)	684
Energy Systems Management, Graduate Certificate (Boston)	684
Engineering Business, Graduate Certificate (Boston)	685
Engineering Economic Decision Making, Graduate Certificate (Boston)	687
Engineering Management, Graduate Certificate (Boston)	687
Lean Six Sigma, Graduate Certificate (Boston)	688
Renewable Energy, Graduate Certificate (Boston)	688
Software Engineering Systems, Graduate Certificate (Boston)	689
Supply Chain Engineering Management, Graduate Certificate (Boston)	689
Sustainable Energy Systems, Graduate Certificate (Boston)	690
Technology Systems Management, Graduate Certificate (Boston)	690
Multidisciplinary Programs	691
Information Systems, MSIS (Arlington)	692
Information Systems, MSIS (Boston)	693
Information Systems, MSIS (Miami)	695
Information Systems, MSIS (Oakland)	697
Information Systems, MSIS (Portland)	698
Information Systems, MSIS (Seattle)	700
Information Systems, MSIS (Silicon Valley)	701
Information Systems, MSIS (Toronto)	702
Information Systems, MSIS (Vancouver)	704

Information Systems, MSIS—Online	706
Information Systems, MSIS—Bridge (Arlington)	708
Information Systems, MSIS—Bridge (Boston)	710
Information Systems, MSIS—Bridge (Miami)	711
Information Systems, MSIS—Bridge (Oakland)	713
Information Systems, MSIS—Bridge (Portland)	713
Information Systems, MSIS—Bridge (Seattle)	714
Information Systems, MSIS—Bridge (Silicon Valley)	716
Information Systems, MSIS—Bridge (Toronto)	716
Information Systems, MSIS—Bridge (Vancouver)	719
Information Systems, MSIS—Bridge—Online	721
Cyber-Physical Systems, MS (Boston)	722
Cyber-Physical Systems, MS (Toronto)	723
Data Architecture and Management, MS (Boston)	724
Data Architecture and Management, MS (Seattle)	725
Data Architecture and Management, MS (Toronto)	728
Software Engineering Systems, MS (Arlington)	730
Software Engineering Systems, MS (Boston)	732
Software Engineering Systems, MS (Toronto)	733
Telecommunication Networks, MS (Boston)	735
Blockchain and Smart Contract Engineering, Graduate Certificate (Arlington)	737
Blockchain and Smart Contract Engineering, Graduate Certificate (Boston)	737
Broadband Wireless Systems, Graduate Certificate (Boston)	738
Engineering Leadership, Graduate Certificate (Boston)	738
IP Telephony Systems, Graduate Certificate (Boston)	740
Medical Software Engineering, Graduate Certificate (Boston)	740
Software Engineering Systems, Graduate Certificate (Arlington)	741
Software Engineering Systems, Graduate Certificate (Boston)	689
Interdisciplinary Graduate Programs	742
Cybersecurity, PhD (Boston)	418
Interdisciplinary Engineering, PhD (Boston)	486
Applied Physics and Engineering, MS (Boston)	557
Artificial Intelligence, MS (Boston)	164
Climate Science and Engineering, MS (Boston)	520
Data Science, MS (Boston)	169
Data Science—Align, MS (Boston)	172
Extended Realities, MS (Boston)	175
Product Development, MS (Boston)	765
AI Applications, Graduate Certificate (Boston)	190
AI Applications, Graduate Certificate (Silicon Valley)	191
Product Management, Graduate Certificate (Boston)	192
Graduate Certificate Programs	770
Bouvé College of Health Sciences	771

Academic Policies and Procedures	772
Interdisciplinary Programs	780
Network Science, PhD (Boston)	241
Personal Health Informatics, PhD (Boston)	339
Healthcare Leadership, DMSc (Boston)	788
Complex Network Analysis, MS (Boston)	166
Extended Realities, MS (Boston)	175
Health Data Analytics, MS—Online	800
Health Informatics, MS (Boston)	447
Health Informatics, MS (Vancouver)	450
Pharmaceutical Engineering, MS (Boston)	507
Statistics, MS (Boston)	187
Statistics, MS—Connect (Boston)	189
Law, JD / Public Health, MPH (Boston)	810
Pharmacy, PharmD—Direct Entry / Public Health, MPH (Boston)	811
Public Health, MPH / Health Informatics, MS (Boston)	811
AI Applications, Graduate Certificate (Boston)	190
Applied Psychology in Context, Graduate Certificate (Boston)	812
Cannabis Science, Graduate Certificate (Boston)	812
Early Intervention, Graduate Certificate (Boston)	813
Extreme Medicine, Graduate Certificate (Boston)	814
Health Informatics Management and Exchange, Graduate Certificate (Boston)	815
Patient Safety, Graduate Certificate (Boston)	815
School of Clinical and Rehabilitation Sciences	816
Speech-Language Pathology, MS (Boston)	818
Speech-Language Pathology, MS (Charlotte)	820
Speech-Language Pathology, MS—Connect (Boston)	822
Speech-Language Pathology, MS—Connect (Charlotte)	823
Healthcare Leadership, DMSc (Boston)	788
Physician Assistant, MS (Boston)	830
Human Movement and Rehabilitation Sciences, PhD (Boston)	831
Physical Therapy, DPT—Postbaccalaureate Entry (Boston)	834
Extended Realities, MS (Boston)	175
Human Movement and Rehabilitation Sciences, MS (Boston)	845
Extreme Medicine, Graduate Certificate (Boston)	814
School of Community Health and Behavioral Sciences	847
Counseling Psychology, PhD (Boston)	849
School Psychology, PhD (Boston)	851
School Psychology, CAGS (Boston)	853
Applied Behavior Analysis, MS (Boston)	854
Applied Behavior Analysis, MS (Charlotte)	856
Applied Educational Psychology, MS (Boston)	858
Applied Psychology, MS (Boston)	859

Counseling Psychology, MSCP (Boston)	860
Early Intervention, Graduate Certificate (Boston)	813
Personal Health Informatics, PhD (Boston)	339
Population Health, PhD (Boston)	866
Public Health, MPH (Boston)	869
Public Health, MPH (Charlotte)	871
Public Health, MPH—Accelerated (Boston)	872
Complex Network Analysis, MS (Boston)	166
Health Data Analytics, MS—Online	800
Health Informatics, MS (Boston)	447
Health Informatics, MS (Vancouver)	450
Statistics, MS (Boston)	187
Statistics, MS—Connect (Boston)	189
Law, JD / Public Health, MPH (Boston)	810
Pharmacy, PharmD—Direct Entry / Public Health, MPH (Boston)	811
Public Health, MPH / Health Informatics, MS (Boston)	811
AI Applications, Graduate Certificate (Boston)	190
Applied Psychology in Context, Graduate Certificate (Boston)	812
Health Informatics Management and Exchange, Graduate Certificate (Boston)	815
School of Nursing	887
Nursing, PhD (Boston)	888
Nurse Anesthesia, DNP (Boston)	890
Nursing, DNP (Boston)	892
Nursing, DNP—Post-Masters (Boston)	895
Nursing, DNP—Post-Masters (Charlotte)	896
Adult-Gerontology Nurse Practitioner, Acute Care, CAGS (Boston)	896
Adult-Gerontology Nurse Practitioner, Primary Care, CAGS (Boston)	897
Neonatal Nurse Practitioner, CAGS (Boston)	898
Pediatric Nurse Practitioner, Acute Care, CAGS (Boston)	898
Pediatric Nurse Practitioner, Acute and Primary Care, CAGS (Boston)	899
Pediatric Nurse Practitioner, Primary Care, CAGS (Boston)	900
Psychiatric-Mental Health Nurse Practitioner, CAGS (Boston)	900
Nursing, MS (Boston)	901
Nursing—Direct Entry, MS (Boston)	905
Nursing Leadership, MS (Boston)	909
Patient Safety, Graduate Certificate (Boston)	815
Pediatric Nurse Practitioner, Acute Care, Graduate Certificate (Boston)	911
Primary Care Nursing FNP, Graduate Certificate (Boston)	912
School of Pharmacy and Pharmaceutical Sciences	914
Biomedical Science, PhD (Boston)	915
Medicinal Chemistry and Drug Discovery, PhD (Boston)	921
Pharmaceutics and Drug Delivery, PhD (Boston)	927
Pharmacology, PhD (Boston)	933

Pharmacy, PharmD (Boston)	938
Pharmacy, PharmD—Direct Entry (Boston)	939
Biomedical Science, MS (Boston)	945
Medicinal Chemistry and Drug Discovery, MS (Boston)	947
Pharmaceutical Engineering, MS (Boston)	507
Pharmaceutics and Drug Delivery, MS (Boston)	952
Pharmacology, MS (Boston)	955
Pharmacy, PharmD—Direct Entry / Public Health, MPH (Boston)	811
Cannabis Science, Graduate Certificate (Boston)	812
School of Law	960
Academic Policies and Procedures	962
Grades	962
Law, JD (Boston)	962
Law, LLM (Boston)	964
Law, LLM—Online	970
Legal Studies, MLS—Online	970
Media Advocacy, MS (Boston)	232
Graduate Certificates	973
Business Law, Graduate Certificate (Boston)	973
Healthcare Compliance, Graduate Certificate (Boston)	973
Health Law, Graduate Certificate (Boston)	974
Health Law and Policy, Graduate Certificate (Boston)	975
Human Resources Law, Graduate Certificate (Boston)	976
Human Rights Law, Graduate Certificate (Boston)	976
Intellectual Property Law, Graduate Certificate (Boston)	977
Legal Design, Graduate Certificate (Boston)	978
Poverty Law and Economic Justice, Graduate Certificate (Boston)	979
Privacy Law, Graduate Certificate (Boston)	981
United States Law, Graduate Certificate (Boston)	981
Women, Gender, Sexuality, and the Law, Graduate Certificate (Boston)	982
Accelerated Degrees	983
Dual Degrees	983
Law, JD / Accounting and Business Administration, MSAMBA (Boston)	305
Law, JD / Business Administration, MBA—Full-Time (Boston)	305
Law, JD / Criminology and Justice Policy, PhD (Boston)	984
Law, JD / Criminology and Criminal Justice, MS (Boston)	984
Law, JD / Public Health, MPH (Boston)	810
Law, JD / Public Policy, MPP (Boston)	984
Law, LLM / Business Administration, MBA—Full-Time (Boston)	305
College of Professional Studies	986
Academic Policies and Procedures	987
Academic Progression Standards	987
Academic Resources	988

Active-Duty Military Personnel	988
Attendance Verification	988
Completing Degree Requirements	989
Degrees, Majors, and Concentrations	989
Full-Time Status	989
Global Partnership Programs	990
Graduate Campus	990
Master's Degree Admission Requirements	990
New Student Orientation (On-Ground and Online)	991
Personal Professional Enrichment (PPE)	991
Readmission to Program	991
Reentry to Program	991
Registration and Taking Courses	991
Reinstatement after Academic Dismissal	993
Seeking More than One Certificate or Degree	993
Special Student Status	994
Student Evaluation of Courses	994
Transfer Credit Policies	994
Doctoral Degree Programs	995
Education, EdD (Boston)	996
Education, EdD (Seattle)	999
Law and Policy, DLP (Boston)	1001
Law and Policy, DLP (Seattle)	1002
Master's Degree Programs	1003
Security and Intelligence Studies, MA (Arlington)	1004
Security and Intelligence Studies, MA (Boston)	1007
Elementary Education, MAT (Boston)	1008
Secondary Education, MAT (Boston)	1010
Education, MEd (Boston)	1012
Higher Education Administration, MEd (Boston)	1014
Analytics, MPS (Arlington)	1015
Analytics, MPS (Boston)	1017
Analytics, MPS (Oakland)	1019
Analytics, MPS (Portland)	1021
Analytics, MPS (Seattle)	1022
Analytics, MPS (Silicon Valley)	1024
Analytics, MPS (Toronto)	1026
Analytics, MPS (Vancouver)	1027
Applied Logistics, MPS (Boston)	1029
Applied Machine Intelligence, MPS (Boston)	1031
Applied Machine Intelligence, MPS (Portland)	1033
Digital Media, MPS (Boston)	1035
Digital Media, MPS (Vancouver)	1037

Digital Media, MPS—Connect (Boston)	1038
Digital Media, MPS—Connect (Vancouver)	1041
Informatics, MPS (Boston)	1042
Informatics, MPS (Toronto)	1044
Insurance Analytics and Management, MPS (Boston)	1046
Learning Experience Design and Technology, MPS (Boston)	1047
Commerce and Economic Development, MS (Boston)	1049
Corporate and Organizational Communication, MS (Boston)	1051
Global Studies and International Relations, MS (Boston)	1054
Human Resources Management, MS (Boston)	1057
Nonprofit Management, MS (Boston)	1060
Organizational Leadership, MS (Boston)	1064
Project Management, MS (Arlington)	1067
Project Management, MS (Boston)	1068
Project Management, MS (Miami)	1071
Project Management, MS (Portland)	1072
Project Management, MS (Seattle)	1075
Project Management, MS (Silicon Valley)	1077
Project Management, MS (Toronto)	1078
Regulatory Affairs, MS (Boston)	1081
Regulatory Affairs, MS (Toronto)	1083
Sports Leadership, MSLD (Boston)	1085
Graduate Certificate Programs	1087
3-D Animation, Graduate Certificate (Boston)	1088
Agile Project Management, Graduate Certificate (Boston)	1088
Applied Analytics, Graduate Certificate (Boston)	1089
Applied Analytics, Graduate Certificate (Portland)	1090
Biopharmaceutical Regulatory Affairs, Graduate Certificate (Boston)	1090
Cloud Computing Application and Management, Graduate Certificate (Boston)	1091
Collegiate Athletics Administration, Graduate Certificate (Boston)	1091
Construction Management, Graduate Certificate (Boston)	1092
Cross-Cultural Communication, Graduate Certificate (Boston)	1092
Digital Media Management, Graduate Certificate (Boston)	1093
Digital Video, Graduate Certificate (Boston)	1093
eSports, Graduate Certificate (Boston)	1094
Experiential Teaching and Learning, Graduate Certificate (Boston)	1094
Financial Markets And Institutions, Graduate Certificate (Boston)	1095
Forensic Accounting, Graduate Certificate (Boston)	1095
Fundraising and Development, Graduate Certificate (Boston)	1096
Game Design, Graduate Certificate (Boston)	1096
Geographic Information Systems, Graduate Certificate (Boston)	1097
Global Studies And International Relations, Graduate Certificate (Boston)	1097
Higher Education Administration, Graduate Certificate (Boston)	1098

Human-Centered Informatics, Graduate Certificate (Boston)	1099
Human Resources Management, Graduate Certificate (Boston)	1099
Information Security Management, Graduate Certificate (Boston)	1100
Insurance Analytics and Management, Graduate Certificate (Boston)	1101
Interactive Design, Graduate Certificate (Boston)	1101
International Biopharmaceutical Regulatory Affairs, Graduate Certificate (Boston)	1102
Leadership, Graduate Certificate (Boston)	1102
Leading and Managing Technical Projects, Graduate Certificate (Boston)	1103
Learning Experience Design and Technology, Graduate Certificate (Boston)	1104
Medical Devices Regulatory Affairs, Graduate Certificate (Boston)	1105
Nonclinical Biomedical Product Regulation, Graduate Certificate (Boston)	1105
Nonprofit Management, Graduate Certificate (Boston)	1106
Organizational Communication, Graduate Certificate (Boston)	1107
Professional Sports Administration, Graduate Certificate (Boston)	1107
Project Business Analysis, Graduate Certificate (Boston)	1108
Project Management, Graduate Certificate (Boston)	1108
Project Management, Graduate Certificate (Portland)	1109
Public and Media Relations, Graduate Certificate (Boston)	1110
Quality Assurance Compliance, Graduate Certificate (Boston)	1111
Remote Sensing, Graduate Certificate (Boston)	1111
Social Media for Organizational Performance, Graduate Certificate (Boston)	1112
Usability, Graduate Certificate (Boston)	1112
College of Science	1114
Academic Policies and Procedures	1115
Academic Appeals Policies	1115
Awards	1117
Changes in Requirements	1117
Cooperative Education Policies	1117
Course Registration	1118
The Doctor of Philosophy Degree (PhD)	1119
Grading Policies	1120
The Master's Degree Academic Requirements	1120
Satisfactory Progress	1120
Time Limitation	1120
Transfer Credit	143
Biology	1121
Biology, PhD (Boston)	1121
Bioinformatics, MS (Boston)	1123
Bioinformatics, MS (Oakland)	1127
Bioinformatics, MS (Portland)	1130
Bioinformatics, MS (Toronto)	1133
Cell and Gene Therapies, MS (Boston)	1135
Bioinformatics, Graduate Certificate (Boston)	1136

Bioinformatics, Graduate Certificate (Portland)	1138
Omics, Graduate Certificate (Boston)	1139
Chemistry and Chemical Biology	1140
Chemistry, PhD (Boston)	1141
Biotechnology, MS (Boston)	1142
Biotechnology, MS (Oakland)	1147
Biotechnology, MS (Portland)	1150
Biotechnology, MS (Toronto)	1154
Chemistry, MS (Boston)	1157
Biodefense and Biosecurity, Graduate Certificate (Boston)	1159
Biopharmaceutical Analytical Sciences, Graduate Certificate (Boston)	1160
Biotechnology, Graduate Certificate (Boston)	1160
Biotechnology, Graduate Certificate (Portland)	1160
Biotechnology Enterprise, Graduate Certificate (Boston)	1161
Biotechnology Regulatory Science, Graduate Certificate (Boston)	1161
Experimental Biotechnology, Graduate Certificate (Boston)	1162
Manufacturing and Quality Operations in Biotechnology, Graduate Certificate (Boston)	1162
Molecular Biotechnology, Graduate Certificate (Boston)	1162
Molecular Biotechnology, Graduate Certificate (Portland)	1163
Pharmaceutical Technologies, Graduate Certificate (Boston)	1163
Process Science, Graduate Certificate (Boston)	1164
Vaccine Development, Graduate Certificate (Boston)	1164
Marine and Environmental Sciences	1164
Marine and Environmental Sciences, PhD (Boston)	1165
Human Behavior and Sustainability Sciences, PhD (Boston)	1169
Climate Science and Engineering, MS (Boston)	520
Environmental Science and Policy, MS (Boston)	1174
Marine Biology, MS (Boston)	1175
Sustainability Sciences, Graduate Certificate (Boston)	1176
Mathematics	1177
Mathematics, PhD (Boston)	1178
Applied Mathematics, MS (Boston)	1184
Mathematics, MS (Boston)	1187
Statistics, MS (Boston)	187
Statistics, MS—Connect (Boston)	189
Operations Research, MSOR (Boston)	1191
Applied Mathematics, Graduate Certificate (Boston)	1192
Physics	1193
Physics, PhD (Boston)	1193
Physics, PhD—Advanced Entry (Boston)	1197
Applied Physics and Engineering, MS (Boston)	557
Complex Network Analysis, MS (Boston)	166
Nanomedicine, MS (Boston)	1205

Physics, MS (Boston)	1209
Nanomedicine, Graduate Certificate (Boston)	1211
Psychology	1212
Human Behavior and Sustainability Sciences, PhD (Boston)	1169
Psychology, PhD (Boston)	1215
Cross-Disciplinary Science PhD	1218
Interdisciplinary Programs	1218
Biophysics, PhD (Boston)	1219
Network Science, PhD (Boston)	241
Applied Physics and Engineering, MS (Boston)	557
Climate Science and Engineering, MS (Boston)	520
Complex Network Analysis, MS (Boston)	166
Environmental Science and Policy, MS (Boston)	1174
Statistics, MS (Boston)	187
Statistics, MS—Connect (Boston)	189
Graduate Certificate Programs	1236
College of Social Sciences and Humanities	1238
General Regulations	1239
Academic Appeals Procedures	1239
Doctor of Philosophy	1241
General Information	1243
Master's Degrees	1244
Regulations for All Students	1244
School of Criminology and Criminal Justice	1246
Criminology and Justice Policy, PhD (Boston)	1246
Criminology and Criminal Justice, MS (Boston)	1249
Law, JD / Criminology and Justice Policy, PhD (Boston)	984
Law, JD / Criminology and Criminal Justice, MS (Boston)	984
Crime Analysis and Mapping, Graduate Certificate (Boston)	1251
Economics	1252
Economics, PhD (Boston)	1253
Economics, MS (Boston)	1256
Economics, MS (Seattle)	1258
English	1259
English, PhD (Boston)	1260
English, MA (Boston)	1262
Digital Humanities, Graduate Certificate (Boston)	1263
History	1265
History, PhD (Boston)	1265
History, MA (Boston)	1267
Public History, Graduate Certificate (Boston)	1269
Political Science	1269
Political Science, PhD (Boston)	1270

Political Science, MA (Boston)	1272
Resilience Studies, MS (Boston)	1275
Resilience Studies, Graduate Certificate (Boston)	1276
School of Public Policy and Urban Affairs	1277
Public Policy, PhD (Boston)	1278
International Affairs, MA (Boston)	1283
Public Administration, MPA (Arlington)	1285
Public Administration, MPA (Boston)	1286
Public Administration, MPA (Oakland)	1287
Public Policy, MPP (Arlington)	1289
Public Policy, MPP (Boston)	1290
Public Policy, MPP (Oakland)	1292
Engineering and Public Policy, MS (Boston)	523
Environmental Science and Policy, MS (Boston)	1174
Urban Informatics, MS (Arlington)	1298
Urban Informatics, MS (Boston)	1299
Urban Planning and Policy, MS (Boston)	254
Law, JD / Public Policy, MPP (Boston)	984
Nonprofit Sector, Philanthropy, and Social Change, Graduate Certificate (Arlington)	1307
Nonprofit Sector, Philanthropy, and Social Change, Graduate Certificate (Boston)	1307
Public Policy Analysis, Graduate Certificate (Arlington)	1308
Public Policy Analysis, Graduate Certificate (Boston)	1309
Sustainability and Climate Change Policy, Graduate Certificate (Boston)	1310
Urban Analytics, Graduate Certificate (Boston)	1311
Urban Studies, Graduate Certificate (Boston)	1311
Sociology	1312
Sociology, PhD (Boston)	1313
Interdisciplinary Programs	1317
Network Science, PhD (Boston)	241
Applied Quantitative Methods and Social Analysis, MS (Boston)	1321
Applied Quantitative Methods and Social Analysis, MS (Arlington)	1323
Complex Network Analysis, MS (Boston)	166
Extended Realities, MS (Boston)	175
AI Applications, Graduate Certificate (Boston)	190
Computational Social Science, Graduate Certificate (Boston)	1333
Computational Social Science, Graduate Certificate (Arlington)	1334
Information Ethics, Graduate Certificate (Boston)	1334
Women's, Gender, and Sexuality Studies, Graduate Certificate (Boston)	1335
Mills College at Northeastern	1337
Academic Policies and Procedures	1338
Academic Appeals Policy	1338
Changes in Requirements	1340
Continuity of Registration	1340

Course Registration and Advising	1340
Grading	1340
Satisfactory Progress	1341
Student Complaints and Grievance Process	1341
Time Limitation	1341
Early Childhood Education, MA (Oakland)	1341
Educational Leadership, MA (Oakland)	1344
Multiple Subject Education, MA (Oakland)	1345
Single Subject Education, MA (Oakland)	1346
AI Applications, Graduate Certificate (Boston)	190
Gordon Institute of Engineering Leadership	1349
Engineering Leadership, Graduate Certificate (Boston)	738
Technology Leadership, Graduate Certificate (Boston)	1352
Additional Programs	1355
Professional Studies, DPS (Boston)	1356
Applied AI, MPS (Boston)	1357
Applied AI—Connect, MPS (Boston)	1359
Global Doctoral Research, Graduate Certificate (Boston)	1361
Organizational Communication, Graduate Certificate—Online	1361
Postsecondary Teaching, Graduate Certificate (Boston)	1362
Project Management, Graduate Certificate—Online	1362
Index	1364

Delivery of Services

Northeastern University assumes no liability for delay or failure to provide educational or other services or facilities due to causes beyond its reasonable control. Causes include, without limitation, power failure, fire, strikes by university employees or others, damage by natural elements, and acts of public authorities. The university will, however, exert reasonable efforts, when it judges them to be appropriate, to provide comparable services, facilities, or performance; but its inability or failure to do so shall not subject the university to liability.

In the event that Northeastern determines it must suspend or alter its operations in whole or in part due to epidemic, pandemic, other public health emergency, extreme weather, natural disaster, acts or threatened acts of terrorism or war, or any single act or combination of events beyond the university's control, Northeastern may suspend, reduce, terminate and/or modify its operations in whole or in part, which may or may not include offering online or other alternative learning options, in its discretion. In any such event, Northeastern is under no obligation to refund or credit any portion of tuition, fees, or other charges paid or owed, but it may do so in its discretion.

Northeastern reserves the sole right to promulgate and change rules and regulations and to make changes of any nature in its program; calendar; admissions policies, procedures, and standards; degree requirements; fees; and academic schedule whenever necessary or desirable including, without limitation, changes in course content and class schedule, the cancellation of scheduled classes and other academic activities, and the substitution of alternatives for scheduled classes and other academic activities. In any such case, the university will give whatever notice is reasonably practical.

Northeastern will endeavor to make available to its students a fine education and a stimulating and congenial environment. However, the quality and rate of progress of an individual's academic career and professional advancement upon completion of a degree or program are largely dependent on the individual's own abilities, commitment, and effort. In many professions and occupations, there are also requirements imposed by federal and state statutes and regulatory agencies for certification or entry into a particular field. These requirements may change while a student is enrolled in a program and may vary from state to state or country to country. Although the university stands ready to help its students find out about requirements and changes in them, it is the student's responsibility to initiate the inquiry.

General Information

- Governing Boards and Officers of Northeastern (p. 23)
- University Leadership (p. 25)
- University Faculty (<https://catalog.northeastern.edu/general-information/faculty/>)
- Accreditation (p. 26)
- Authorizations (p. 31)
- Notifications and Disclosures (p. 35)
- Major CIP Codes (p. 37)
- Resources (p. 57)

Governing Boards and Officers of Northeastern

Officers of the Board of Trustees

Richard A. D'Amore, *Chair*

Edward G. Galante, *Vice Chair*

Alan S. McKim, *Vice Chair*

Officers Emeritae/i

Neal F. Finnegan, *Chair Emeritus*

Sy Sternberg, *Chair Emeritus*

George D. Behrakis, *Vice Chair Emeritus*

Richard P. Chapman Jr., *Vice Chair Emeritus*

H. Patricia Hanna, *Vice Chair Emerita*

Robert C. Marini, *Vice Chair Emeritus*

Katherine S. McHugh, *Vice Chair Emerita*

Carole J. Shapazian, *Vice Chair Emerita*

Jean C. Tempel, *Vice Chair Emerita*

Alan D. Tobin, *Vice Chair Emeritus*

Members of the Board of Trustees

Jeffrey S. Bornstein

Subodh Chanrai

Alice Chinebuah

Jeffrey J. Clarke

William J. Conley

Richard A. D'Amore

Deborah Dunsire

Spencer T. Fung

Edward G. Galante

Sir Lucian Grainge, CBE

David L. House

Frances N. Janis

Chaitanya Kanojia

Amin J. Khoury

William A. Lowell

Todd M. Manganaro

Alan S. McKim

James J. Pallotta

Irene Panagopoulos

John V. Pulichino

Kathleen C. Sanborn

Winslow L. Sargeant

Jeannine P. Sargent

Maha Shair

Shelley Stewart Jr.

Hemant Taneja

Jean-Pascal Tricoire

Christopher A. Viehbacher

Gregory Waters

Christophe P. Weber

Ex-Officio

Joseph E. Aoun

Trustees Emeritae/i

Barbara C. Alleyne

George D. Behrakis

Margot Botsford

Frederick Brodsky

Frederick L. Brown

Peter B. Cameron

Richard P. Chapman Jr.

William J. Cotter
John J. Cullinane
Harry T. Daniels
Susan S. Deitch
Neal F. Finnegan
W. Kevin Fitzgerald
H. Patricia Hanna
Arnold S. Hiatt
William S. Howard
Venetia G. Kontogouris
Richard G. Lesse
Diane H. Lupean
Robert C. Marini
Roger M. Marino
Katherine S. McHugh
Kathryn M. Nicholson
Arthur A. Pappas
Marcy L. Reed
Ronald L. Rossetti
Ronald L. Sargent
Carole J. Shapazian
Robert J. Shillman
Janet M. Smith
Sy Sternberg
Jean C. Tempel
Alan D. Tobin
Joseph M. Tucci
Catherine A. White
Arthur W. Zafiripoulo
Michael J. Zamkow
Ellen M. Zane

Honorary Trustees

Scott M. Black
Charles K. Gifford
Lucille R. Zanghi

University Leadership

Senior Leadership

Joseph E. Aoun, BA, MA, PhD, *President*

Beth A. Winkelstein, BSE, PhD, *Provost and Senior Vice President for Academic Affairs*

Ken Henderson, BS, PhD, *Chancellor and Senior Vice President for Learning*

Michael A. Armini, BA, MA, *Senior Vice President for External Affairs*

Mary Ludden, BS, MBA, PhD, *Senior Vice President for Global Network and Strategic Initiatives*

Diane Nishigaya MacGillivray, BA, MA, *Senior Vice President for University Advancement*

Mary Strother, BA, JD, *Senior Vice President and General Counsel*

Thomas Nedell, BA, MBA, *Senior Vice President for Finance and Treasurer*

Academic Deans

Gregory Abowd, BS, MSc, PhD, *Dean of the College of Engineering*

Elizabeth Mynatt, BS, MS, PhD, *Dean of the Khoury College of Computer Sciences*

David De Cremer, MSc, BSc, MA, PhD, *Dean of the D'Amore-McKim School of Business*

Brent Nelson, BS, PhD, *Interim Dean of the College of Science*

R. Benjamin Knapp, BS, MS, PhD, *Dean of the College of Arts, Media and Design*

Jared Auclair, BS, MA, PhD, *Dean of the College of Professional Studies*

James R. Hackney, AB, JD, *Dean of the School of Law*

Kellee Tsai, BA, MA, PhD, *Dean of the College of Social Sciences and Humanities*

Carmen L. Sceppa, BS, MD, PhD, *Dean of the Bouvé College of Health Sciences*

Accreditation

Northeastern University has maintained its status as a member in good standing of the New England Commission of Higher Education, Inc., previously New England Association of Schools and Colleges, since it was awarded its initial accreditation in 1940. The university was last reviewed by NECHE in 2018 and will be reviewed again in fall 2028.

Bouvé College of Health Sciences

Program	Accrediting Agency
BA Public Health (Boston) (https://catalog.northeastern.edu/undergraduate/health-sciences/community-health-behavioral-sciences/#departmentofhealthsciencetext)	Council on Education for Public Health (CEPH) (https://ceph.org/)
BS Health Science (Boston) (https://catalog.northeastern.edu/undergraduate/health-sciences/community-health-behavioral-sciences/#departmentofhealthsciencetext)	Council on Education for Public Health (CEPH) (https://ceph.org/)
MPH Public Health (Boston, Charlotte) (p. 849)	Council on Education for Public Health (CEPH) (https://ceph.org/)
BSN Nursing (Boston, Charlotte) (https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/#programstext)	Commission on Collegiate Nursing Education (CCNE) (https://www.aacnnursing.org/CCNE/)
BSN Nursing (Boston) (https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/bsn/) ²	Massachusetts Board of Registration in Nursing (https://www.mass.gov/orgs/board-of-registration-in-nursing/) ²
BSN Nursing—Transfer Track (Boston, Charlotte) (https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/#programstext)	Commission on Collegiate Nursing Education (CCNE) (https://www.aacnnursing.org/CCNE/)
BSN Nursing—Transfer Track (Boston) (https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/nursing-bsn-transfer-track-bos/) ²	Massachusetts Board of Registration in Nursing (https://www.mass.gov/orgs/board-of-registration-in-nursing/) ²
BSN Nursing—Transfer Track (Charlotte) (https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/nursing-bsn-transfer-track/) ³	North Carolina Board of Nursing (https://www.ncbon.com/) ³
BSN Nursing, Accelerated Program for Second-Degree Students (Boston, Charlotte) (https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/#programstext) ²	Commission on Collegiate Nursing Education (CCNE) (https://www.aacnnursing.org/CCNE/) ²
BSN Nursing, Accelerated Program for Second-Degree Students (Boston) (https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/accelerated-second-degree-students-bsn-bos/) ²	Massachusetts Board of Registration in Nursing (https://www.mass.gov/orgs/board-of-registration-in-nursing/) ²
BSN Nursing, Accelerated Program for Second-Degree Students (Charlotte) (https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/accelerated-second-degree-students-bsn/) ³	North Carolina Board of Nursing (https://www.ncbon.com/) ³
MS Nursing (Boston) (p. 901)	Commission on Collegiate Nursing Education (CCNE) (https://www.aacnnursing.org/CCNE/)
MS Nursing—Direct Entry (Boston) (p. 905)	Commission on Collegiate Nursing Education (CCNE) (https://www.aacnnursing.org/CCNE/)
MS Nursing—Direct Entry (Boston) (p. 905) ²	Massachusetts Board of Registration in Nursing (https://www.mass.gov/orgs/board-of-registration-in-nursing/) ²
MS Nursing Leadership (Boston) (p. 909)	Commission on Collegiate Nursing Education (CCNE) (https://www.aacnnursing.org/CCNE/)
DNP Nursing (Boston) (p. 892)	Commission on Collegiate Nursing Education (CCNE) (https://www.aacnnursing.org/CCNE/)
DNP Nurse Anesthesia (Boston) (p. 890)	Council on Accreditation of Nurse Anesthesia Educational Programs (COA) (https://www.coacna.org/)
DNP Nurse Anesthesia (Boston) (p. 890)	Commission on Collegiate Nursing Education (CCNE) (https://www.aacnnursing.org/CCNE/)

College of Engineering

- BSBioE Bioengineering (Boston) (<https://catalog.northeastern.edu/undergraduate/engineering/bioengineering/bioengineering-bsbioe/>)
 - The BS in Bioengineering is accredited by the Engineering Accreditation Commission of ABET (<https://www.abet.org/>) under the commission's General Criteria and Program Criteria for Bioengineering and Biomedical and Similarly Named Engineering programs.
- BSChE Chemical Engineering (Boston) (<https://catalog.northeastern.edu/undergraduate/engineering/chemical/chemical-engineering-bsche/>)
 - The BS in Chemical Engineering is accredited by the Engineering Accreditation Commission of ABET (<https://www.abet.org/>) under the commission's General Criteria and Program Criteria for Chemical, Biochemical, Biomolecular, and Similarly Named Engineering Programs.
- BSCE Civil Engineering (Boston) (<https://catalog.northeastern.edu/undergraduate/engineering/civil-environmental/civil-engineering-bsce/>)
 - The BS in Civil Engineering is accredited by the Engineering Accreditation Commission of ABET (<https://www.abet.org/>) under the commission's General Criteria and Program Criteria for Civil and Similarly Named Engineering Programs.
- BSCmpE Computer Engineering (Boston) (<https://catalog.northeastern.edu/undergraduate/engineering/electrical-computer/computer-engineering-bscompe/>)
 - The BS in Computer Engineering is accredited by the Engineering Accreditation Commission of ABET (<https://www.abet.org/>) under the commission's General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s), and Similarly Named Engineering Programs.
- BSEE Electrical Engineering (Boston) (<https://catalog.northeastern.edu/undergraduate/engineering/electrical-computer/electrical-engineering-bsee/>)
 - The BS in Electrical Engineering is accredited by the Engineering Accreditation Commission of ABET (<https://www.abet.org/>) under the commission's General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s), and Similarly Named Engineering Programs.
- BSEnvE Environmental Engineering (Boston) (<https://catalog.northeastern.edu/undergraduate/engineering/civil-environmental/environmental-engineering-bsenve/>)
 - The BS in Environmental Engineering is accredited by the Engineering Accreditation Commission of ABET (<https://www.abet.org/>) under the commission's General Criteria and Program Criteria for Environmental Engineering and Similarly Named Engineering Programs.
- BSIE Industrial Engineering (Boston) (<https://catalog.northeastern.edu/undergraduate/engineering/mechanical-industrial/bsie/>)
 - The BS in Industrial Engineering is accredited by the Engineering Accreditation Commission of ABET (<https://www.abet.org/>) under the commission's General Criteria and Program Criteria for Industrial and Similarly Named Engineering Programs.
- BSME Mechanical Engineering (Boston) (<https://catalog.northeastern.edu/undergraduate/engineering/mechanical-industrial/bsme/>)
 - The BS in Mechanical Engineering is accredited by the Engineering Accreditation Commission of ABET (<https://www.abet.org/>) under the commission's General Criteria and Program Criteria for Mechanical and Similarly Named Engineering Programs.

College of Science

Program	Accrediting Agency
BS Biochemistry (Boston) (https://catalog.northeastern.edu/undergraduate/science/biochemistry/biochemistry-bs/)	American Society for Biochemistry and Molecular Biology (ASBMB) (https://www.asbmb.org/)

College of Professional Studies

Program	Accrediting Agency
BS Finance and Accounting Management (Boston) (https://catalog.northeastern.edu/professional-studies/bachelors-postbaccalaureate/finance-accounting-management/) ¹	AACSB International—The Association to Advance Collegiate Schools of Business (https://www.aacsb.edu/)
BS Management (Boston) (https://catalog.northeastern.edu/professional-studies/bachelors-postbaccalaureate/management/) ¹	AACSB International—The Association to Advance Collegiate Schools of Business (https://www.aacsb.edu/)
BSET Computer Engineering Technology	Accredited by the Technology Accreditation Commission of ABET, 111 Market Place Suite 1050 Baltimore, MD 21202-4012 Telephone: 410.347.7700 (https://www.abet.org/)
BSET Electrical Engineering Technology	Accredited by the Technology Accreditation Commission of ABET, 111 Market Place Suite 1050 Baltimore, MD 21202-4012 Telephone: 410.347.7700 (https://www.abet.org/)
BSET Mechanical Engineering Technology	Accredited by the Technology Accreditation Commission of ABET, 111 Market Place Suite 1050 Baltimore, MD 21202-4012 Telephone: 410.347.7700 (https://www.abet.org/)
MS Organizational Leadership (Boston), with concentration in Project Management (p. 1064)	Project Management Institute's Global Accreditation Center (https://www.pmi.org/global-accreditation-center/)
MS Project Management (Arlington, Boston, Miami, Portland, Seattle, Silicon Valley, Toronto) (p. 1003)	Project Management Institute's Global Accreditation Center (https://www.pmi.org/global-accreditation-center/)

MSLD Sports Leadership (Boston) (p. 1085)	Commission on Sport Management Accreditation (https://www.cosmaweb.org/)
Master of Arts in Teaching (Boston) programs in: (p. 1003)	
Elementary Education, 1–6	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/) ²
Sheltered English Immersion Administrator—Endorsement	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/)
Sheltered English Immersion Teacher—Endorsement	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/) ²
Teacher of Biology, 8–12	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/) ²
Teacher of Chemistry, 8–12	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/) ²
Teacher of Earth and Space Science, 8–12	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/) ²
Teacher of English, 5–12	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/) ²
Teacher of English as a Second Language, PreK–6, 5–12	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/) ²
Teacher of History, 5–12	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/) ²
Teacher of Mathematics, 8–12	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/) ²
Teacher of Physics, 8–12	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/) ²
Teacher of Political Science/Political Philosophy, 8–12	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/) ²
Teacher of Social Science, 5–12	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/) ²
Teacher of Students with Moderate Disabilities, PreK–8, 5–12	Massachusetts Department of Elementary and Secondary Education (https://www.doe.mass.edu/) ²

¹ Accredited under the aegis of the “sponsoring” full-time college.

² The Massachusetts Department of Elementary and Secondary Education approves (not accredits) programs.

College of Social Sciences and Humanities

Program	Accrediting Agency
BS American Sign Language—English Interpreting (Boston) (https://catalog.northeastern.edu/undergraduate/social-sciences-humanities/cultures-societies-global-studies/american-sign-language-english-interpreting-bs/)	Commission on Collegiate Interpreter Education (http://www.ccie-accreditation.org/)
MPA Public Administration (Arlington, Boston, Oakland) (p. 1277)	Network of Schools of Public Policy, Affairs, and Administration (https://www.naspaa.org/)

D’Amore-McKim School of Business

Program	Accrediting Agency
All programs offered in 2025–2026	AACSB International—Association to Advance Collegiate Schools of Business (https://www.aacsb.edu/)

School of Law

Program	Accrediting Agency
JD Law (Boston) (p. 962)	American Bar Association; Association of American Law Schools ¹

¹ The Association of American Law Schools is an elected membership organization, not an accrediting body.

Authorizations

Northeastern University's degree-granting authority is rooted in its charter, which was established by an act of the Massachusetts Legislature in 1916.

Campus Locations and Regulatory Agencies

In addition to accreditation by the New England Commission of Higher Education, Northeastern University is regulated by local authorities for its global campus network locations. These agencies are as follows:

- Arlington, Virginia
 - State Council of Higher Education for Virginia
- Charlotte, North Carolina
 - Board of Governors of the University of North Carolina
- Miami, Florida
 - Florida Commission for Independent Education
- Portland, Maine
 - Maine Department of Education
- Oakland, California
 - Bureau for Private Postsecondary Education
- San Jose, California
 - Bureau for Private Postsecondary Education
- Seattle, Washington
 - Washington Student Achievement Council
- Toronto, Ontario, Canada
 - Ministry of Colleges, Universities, Research Excellence and Security
- Vancouver, British Columbia, Canada
 - Ministry of Post-Secondary Education and Future Skills

Required Disclosures

VIRGINIA

Northeastern has processes in place to ensure that student grievances are treated with respect and addressed in a fair and professional manner. Students can report concerns to the Office of Student Conduct and Conflict Resolution (<https://www.northeastern.edu/osccr/>) or the Office of the University Ombuds for Graduate Students (<https://graduateombuds.northeastern.edu/>). At the Arlington campus, students can contact the on-site student support specialist or the campus principal.

If a student's problem has not been resolved in pursuance of the Northeastern grievance policy, they may contact the State Council of Higher Education for Virginia. SCHEV representatives can be reached via telephone at (804) 225-2600; via fax at (804) 225-2604; at this website (<https://www.schev.edu/students/resources/student-complaints/>); or by mail at 101 N. 14th Street, 10th Floor, James Monroe Building, Richmond, VA 23219.

The Virginia State Approving Agency is the approving authority of education and training programs for Virginia. Our office investigates complaints of GI Bill® beneficiaries. While most complaints should initially follow the school grievance policy, if the situation cannot be resolved at the school, the beneficiary should contact our office via email saa@dvs.virginia.gov. *GI Bill® is a registered trademark of the U.S. Department of Veterans Affairs. More information about education benefits offered by VA is available at the official U.S. government website at <http://www.benefits.va.gov/gibill> (<http://www.benefits.va.gov/gibill/>).*

NORTH CAROLINA

Northeastern has been evaluated by the University of North Carolina and is licensed to conduct higher education degree activity in the state. The university's guaranty bond for unearned prepaid tuition is on file with the Board of Governors of the University of North Carolina and the Office of the General Counsel at Northeastern. North Carolina students may view a copy of the Tuition Guaranty Bond by contacting Northeastern's Risk Services at 716 Columbus Avenue (Columbus Place), Suite 301 CP, Boston, MA 02120.

If students are unable to resolve a complaint offered by the Northeastern grievance procedures, they can submit a complaint through the online student complaint form at <https://studentcomplaints.northcarolina.edu/form> (<https://studentcomplaints.northcarolina.edu/form/>), or by mail to North Carolina Post-Secondary Education Complaints, 140 Friday Center Drive, Chapel Hill, NC 27517. <https://www.northcarolina.edu/post-secondary-education-complaints/>.

FLORIDA

Northeastern University—Miami is accredited by the New England Commission of Higher Education and is provisionally licensed in the state of Florida by the Commission on Independent Education. Additional information regarding the institution may be obtained by contacting the Commission for Independent Education, Department of Education, 325 West Gaines Street, Suite 1414, Tallahassee, Florida 32399-0400, toll-free telephone number (888) 224-6684.

The transferability of credits you earn at Northeastern is at the complete discretion of an institution to which you may seek to transfer. Acceptance of the degree you earn in the educational program is also at the complete discretion of the institution to which you may seek to transfer. If the credits or degree that you earn at this institution are not accepted at the institution to which you seek to transfer, you may be required to repeat some or all of your coursework at that institution. For this reason you should make certain that your attendance at this institution will meet your educational goals. This may include contacting an institution to which you may seek to transfer after attending Northeastern to determine if your credits or degree will transfer.

CALIFORNIA

Any questions a student may have regarding this catalog that have not been satisfactorily answered by the institution may be directed to the Bureau for Private Postsecondary Education (<http://www.bppe.ca.gov>), 1747 N. Market Blvd., Ste. 225, Sacramento, CA 95834; P.O. Box 980818, West Sacramento, CA 95798-0818, (888) 370-7589, or by fax (916) 263-1897.

NOTICE CONCERNING TRANSFERABILITY OF CREDITS AND CREDENTIALS EARNED AT OUR INSTITUTION

The transferability of credits you earn at Northeastern is at the complete discretion of an institution to which you may seek to transfer. Acceptance of the degree you earn in the educational program is also at the complete discretion of the institution to which you may seek to transfer. If the credits or degree that you earn at this institution are not accepted at the institution to which you seek to transfer, you may be required to repeat some or all of your coursework at that institution. For this reason you should make certain that your attendance at this institution will meet your educational goals. This may include contacting an institution to which you may seek to transfer after attending Northeastern to determine if your credits or degree will transfer.

The Office of Student Assistance and Relief is available to support prospective students, current students, or past students of private postsecondary educational institutions in making informed decisions, understanding their rights, and navigating available services and relief options. The office may be reached by calling (888) 370-7589 or by visiting <https://osar.bppe.ca.gov/>.

WASHINGTON

Northeastern is authorized by the Washington Student Achievement Council and meets the requirements and minimum educational standards established for degree-granting institutions under the Degree-Granting Institutions Act. This authorization is subject to periodic review and authorizes Northeastern to offer specific degree programs. The council may be contacted for a list of currently authorized programs. Authorization by the council does not carry with it an endorsement by the council of the institution or its programs. Any person desiring information about the requirements of the act or the applicability of those requirements to the institution may contact the council at P.O. Box 43430, Olympia, WA 98504-3430 or by email at degreeauthorization@wsac.wa.gov.

The transferability of credits earned at Northeastern is at the discretion of the receiving college, university, or other educational institution. Students considering transferring to any institution should not assume that credits earned in any program of study at Northeastern will be accepted by the receiving institution. Similarly, the ability of a degree, certificate, diploma, or other academic credential earned at Northeastern to satisfy an admission requirement of another institution is at the discretion of the receiving institution. Accreditation does not guarantee credentials or credits earned at Northeastern will be accepted by or transferred to another institution. To minimize the risk of having to repeat coursework, students should contact the receiving institution in advance for evaluation and determination of transferability of credits and/or acceptability of degrees, diplomas, or certificates earned. The Washington Student Achievement Council has authority to investigate student complaints against specific schools. WSAC may not be able to investigate every student complaint. Visit <http://www.wsac.wa.gov/student-complaints> (<http://www.wsac.wa.gov/student-complaints/>) for information regarding the WSAC complaint process.

ONTARIO

Master of Science in Project Management (p. 1078)

This institution has been granted consent by the Minister of Colleges, Universities, Research Excellence and Security to offer this degree program for a five-year term starting July 28, 2021. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

Master of Science in Regulatory Affairs (p. 1083)

This institution has been granted consent by the Minister of Colleges, Universities, Research Excellence and Security to offer this degree program for a five-year term starting June 25, 2021. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

Master of Professional Studies in Analytics (p. 1026)

This institution has been granted consent by the Minister of Colleges, Universities, Research Excellence and Security to offer this degree program for a five-year term starting March 6, 2020. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

Master of Professional Studies in Informatics (p. 1044)

This institution has been granted consent by the Minister of Colleges, Universities, Research Excellence and Security to offer this degree program for a five-year term starting March 6, 2020. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

Master of Science in Information Systems (p. 702)

This institution has been granted consent by the Minister of Colleges, Universities, Research Excellence and Security to offer this degree program for a five-year term starting July 28, 2021. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

Master of Science in Biotechnology (p. 1154)

This institution has been granted consent by the Minister of Colleges, Universities, Research Excellence and Security to offer this degree program for a five-year term starting September 14, 2021. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

Master of Science in Cyber-Physical Systems (p. 723)

This institution has been granted consent by the Minister of Colleges, Universities, Research Excellence and Security to offer this degree program for a five-year term starting January 18, 2023. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

Master of Science in Bioinformatics (p. 1133)

This institution has been granted consent by the Minister of Colleges, Universities, Research Excellence and Security to offer this degree program for a five-year term starting January 18, 2023. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

Master of Science in Software engineering systems (p. 733)

This institution has been granted consent by the Minister of Colleges, Universities, Research Excellence and Security to offer this degree program for a five-year term starting April 4, 2025. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

Master of Science in Data architecture and management (p. 728)

This institution has been granted consent by the Minister of Colleges, Universities, Research Excellence and Security to offer this degree program for a five-year term starting April 4, 2025. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

BRITISH COLUMBIA**Master of Science in Computer Science (p. 398)**

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective July 7, 2019, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

Align—Master of Science in Computer Science (p. 413)

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective July 7, 2019, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

Master of Science in Data Analytics Engineering (p. 634)

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective November 29, 2021, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

Master of Science in Information Design and Data Visualization (p. 222)

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective October 28, 2021, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

Master of Professional Studies in Analytics (p. 1027)

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective October 28, 2021, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

MASTER OF SCIENCE IN INFORMATION SYSTEMS (p. 704)

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective March 3, 2023, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

MASTER OF professional studies in digital media (p. 1037) (*including connect* (p. 1041))

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective June 6, 2023, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (for example, acceptable to potential employers, professional licensing bodies, or other educational institutions).

MASTER OF science in health informatics (p. 450)

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective January 31, 2025, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (for example, acceptable to potential employers, professional licensing bodies, or other educational institutions).

Distance Education/State Authorization Reciprocity Agreement Student Complaint Procedures (<https://graduate.northeastern.edu/state-authorization-statements-and-complaint-resolution/>)

Notifications and Disclosures

The *Northeastern University Catalog* contains the university's primary statements about approved academic programs and degree requirements, as authorized by the president or the Board of Trustees.

The *Northeastern University Catalog* contains current information about the university calendar, admissions, degree requirements, fees, and certain procedures and regulations; however, such information is not intended and should not be regarded to be contractual. Course information was current as of June 5, 2025. For updated course information, students and advisors should consult the Banner course catalog (<https://nubanner.neu.edu/StudentRegistrationSsb/ssb/term/termSelection/?mode=courseSearch>).

Accreditation

Please visit the Accreditation (<https://catalog.northeastern.edu/graduate/appendix/statements-accreditation/>) page of this catalog for details of Northeastern University's accreditation status.

FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT

In accordance with the Family Educational Rights and Privacy Act of 1974, Northeastern University permits its students to inspect their records wherever appropriate and to challenge specific parts of them when they feel it is necessary to do so. Specific details of the law as it applies to Northeastern are discussed in this section of the catalog (p. 127).

PERSISTENCE RATES UNDER THE STUDENT RIGHT-TO-KNOW ACT

In the fall of 2024, the persistence rate for undergraduate students who entered in the fall 2023 cohort was 96.9%.

TUITION DEFAULT POLICY

In cases where the student defaults on their tuition, the student shall be liable for the outstanding tuition and all reasonable associated collection costs incurred by the university, including attorneys' fees.

NONDISCRIMINATION POLICIES

Northeastern University is committed to providing a living, learning, and working environment free from discrimination and harassment and does not discriminate on the basis of race, color, religion, religious creed, genetic information, sex (including on the basis of sex stereotypes, sex characteristics, pregnancy, or related conditions), gender, gender identity, gender expression, sexual orientation, age, national origin, ancestry, ethnicity, disability, or veteran or military status in admission to, access to, treatment in, or employment in its programs and activities. The university will not tolerate any conduct that violates rights guaranteed by law, or any of the university policies that prohibit discrimination, including the Policy on Equal Opportunity (https://www.northeastern.edu/policies/pdfs/Policy_on_Equal_Opportunity.pdf), Policy on Sexual and Gender-Based Harassment and Title IX (https://policies.northeastern.edu/policy104/#_ga=21399120526780236931685972406-9222403871666097079), and the Policy on Non-Fraternization (https://www.northeastern.edu/policies/pdfs/Policy_on_Non-Fraternization.pdf). Furthermore, university policy also includes prohibitions of retaliation for filing complaints of discrimination with the Office for University Equity and Compliance. Links to the university's nondiscrimination policies and its grievance procedures are available at the OUEC (<https://www.northeastern.edu/ouec/>). Inquiries regarding the university's nondiscrimination policies may be directed to:

Office for University Equity and Compliance (<https://ouec.northeastern.edu/>)
Mark Jannoni, Assistant Vice President and Title IX Coordinator
125 Richards Hall
Northeastern University
Boston, Massachusetts 02115
617.373.4644
ouec@northeastern.edu

The university strongly encourages any person to report information relating to alleged discrimination or harassment to the OUEC (<https://ouec.northeastern.edu/>) by completing the form available here (<https://web.studentally.com/#/report/northeastern>) or through any of the contact options listed above. OUEC's policies, as well as other helpful information, can be found at the OUEC website (<https://ouec.northeastern.edu/>).

DISABILITY ACCESS SERVICES

Disability Access Services (<https://drc.sites.northeastern.edu/>) provides a variety of disability-related services and accommodations to Northeastern University's students with documented disabilities.

Northeastern's compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 are coordinated by the senior director of Disability Access Services. Persons requiring information regarding Disability Access Services should contact the center at 617.373.2675 or at DASBoston@northeastern.edu.

CLERY ACT

Northeastern University is committed to assisting all members of the university community in providing for their own safety and security. Information regarding campus security and personal safety, including topics such as crime prevention, university police law enforcement authority, crime reporting policies, crime statistics for the most recent three-year period, and disciplinary procedures, is available in the Annual Security & Fire Safety Reports, located on the NUPD website (<https://nupd.northeastern.edu/annual-reports/>).

EMERGENCY INFORMATION

The university is prepared to respond to emergencies and urgent situations that require immediate action with a trained team of police officers, EMTs, health and counseling experts, student affairs and residential life staff, and other professionals from a coordinated group that is able to manage a wide range of potential situations.

In case of emergency or crisis situations that require immediate notification, university officials will deploy the NU Alert system, which sends email, voicemail, and text messages to students, faculty, and staff. NU Alert is intended to communicate pertinent information and, when appropriate, provide directions to those in the affected area(s).

A record of past Timely Warning and NU Alert Emergency Notifications for our campus community can be found on the NUPD website (<https://nupd.northeastern.edu/safety-notifications/>).

Examples of crisis situations range from snowstorms to national emergencies that have a local impact.

Additional information on the university's emergency information systems can be found on the university's Emergency information (<https://www.northeastern.edu/emergency-information/>) website.

MISSION STATEMENT

To educate students for a life of fulfillment and accomplishment.

To create and translate knowledge to meet global and societal needs.

Major CIP Codes

The following is a list of Northeastern University majors for programs accepting new students for the 2025-2026 catalog year, along with each major's corresponding CIP code. "CIP" refers to the Classification of Instructional Programs published by the U.S. Department of Education's National Center for Education Statistics (<https://nces.ed.gov/ipeds/cipcode/Default.aspx?y=56>).

Academic Program	Major Transcript Title	Major CIP Code
P-CERTG-3DAN: 3D Animation, Graduate Certificate	3D Animation	100304
CERTG-ACFD: Accounting and Financial Decision Making, Graduate Certificate	Accntng Fin Decision Making	520899
MSA-ACCT: Accounting, MSA	Accounting	520301
P-CERTU-ACCT: Accounting, Undergraduate Certificate	Accounting	520301
P-CERTU-AACT: Advanced Accounting, Undergraduate Certificate	Advanced Accounting	520301
MS-AIMF: Advanced and Intelligent Manufacturing, MS	Advanced and Intelligent Mfg	143601
P-BS-AVMS: Advanced Manufacturing Systems, BS	Advanced Manufacturing Systems	150613
BA-AFMS: Africana Studies and Media and Screen Studies, BA	Africana St/Media Screen St	050201
BA-AFHS: Africana Studies and Human Services, BA	Africana Stud/Human Services	050201
BA-AFCS: Africana Studies, BA	Africana Studies	050201
BA-AFEN: Africana Studies and English, BA	Africana Studies/English	050201
BA-AFJO: Africana Studies and Journalism, BA	Africana Studies/Journalism	050201
BA-AFPS: Africana Studies and Political Science, BA	Africana Studies/Political Sci	050201
P-CERTG-AGPM: Agile Project Management, Graduate Certificate	Agile Project Management	520211
CERTG-AIAP: AI Applications, Graduate Certificate	AI Applications	110105
P-BS-ANLY: Analytics, BS	Analytics	110802
P-CERTU-ANLY: Analytics, Undergraduate Certificate	Analytics	110802
P-MPS-ANLY: Analytics, MPS	Analytics	110802
MS-AQMS: Applied Quantitative Methods and Social Analysis, MS	Appl Quant Methods Soc Anlys	450102
MPS-APAI: Applied AI, MPS	Applied AI	110102
MPS-APAI-C: Applied AI—Connect, MPS	Applied AI	110102
P-CERTG-APAN: Applied Analytics, Graduate Certificate	Applied Analytics	307101
MS-ABA: Applied Behavior Analysis, MS	Applied Behavior Analysis	422814
MS-AEPP: Applied Educational Psychology, MS	Applied Educational Psychology	422805
P-MPS-APLG: Applied Logistics, MPS	Applied Logistics	520203
P-MPS-APMI: Applied Machine Intelligence, MPS	Applied Machine Intelligence	521301
CERTG-AMTH: Applied Mathematics, Graduate Certificate	Applied Mathematics	270301
MS-AMTH: Applied Mathematics, MS	Applied Mathematics	270301
MS-APNR: Applied Nursing Research, MS	Applied Nursing Research	513808
BS-APHY: Applied Physics, BS	Applied Physics	400801
MS-APEN: Applied Physics and Engineering, MS	Applied Physics/Engineering	400801
MS-APPS: Applied Psychology, MS	Applied Psychology	422813
CERTG-APSC: Applied Psychology in Context, Graduate Certificate	Applied Psychology in Context	422813

BS-ASBA: Architectural Studies and Business Administration, BS	Arch Studies/Business Admin	040801
BS-ARCS: Architectural Studies, BS	Architectural Studies	040801
BS-ARSD: Architectural Studies and Design, BS	Architectural Studies/Design	040803
BS-ARCH: Architecture, BS	Architecture	040902
MARCH-ARCH1: Master of Architecture—One-Year Program	Architecture	040902
MARCH-ARCH2: Master of Architecture—Two-Year Program	Architecture	040902
MARCH-ARCH3: Master of Architecture—Three-Year Program	Architecture	040902
MARCH-ARCH3A: Master of Architecture—Three-Year Program—Advanced Degree Entrance	Architecture	040902
BS-AENG: Architecture and English, BS	Architecture/English	040201
BA-ARTS: Art, BA	Art	500702
MS-ARIN: Artificial Intelligence, MS	Artificial Intelligence	110102
MS-AMCE: Arts Administration and Cultural Entrepreneurship, MS	Arts Adm Cultural Entrepren	501099
CERTG-ARAD: Arts Administration, Graduate Certificate	Arts Administration	501099
BS-ASLI: American Sign Language—English Interpreting, BS	ASL - English Interpreting	161601
BS-ASHU: American Sign Language and Human Services, BS	ASL/Human Services	161601
BS-ASLN: American Sign Language and Linguistics, BS	ASL/Linguistics	161601
BS-ASPS: American Sign Language and Psychology, BS	ASL/Psychology	161601
BS-ASTH: American Sign Language and Theatre, BS	ASL/Theatre	161601
BS-BNPH: Behavioral Neuroscience and Philosophy, BS	Behav Neuroscience/Philosophy	261501
BS-BENS: Behavioral Neuroscience, BS	Behavioral Neuroscience	261501
BS-BNDS: Behavioral Neuroscience and Design, BS	Behavioral Neuroscience/Design	261501
BS-BIOC: Biochemistry, BS	Biochemistry	260202
CERTG-BDBS: Biodefense and Biosecurity, Graduate Certificate	Biodefense and Biosecurity	261201
BSBIOE-BEBN: Bioengineering and Behavioral Neuroscience, BSBioE	Bioeng/Behavioral Neuroscience	149999
BSBIOE-BION: Bioengineering, BSBioE	Bioengineering	149999
MSBIOE-BION: Bioengineering, MSBioE	Bioengineering	149999
MSBIOE-BIONC: Bioengineering, MSBioE—Connect	Bioengineering	149999
PHD-BION: Bioengineering, PhD	Bioengineering	149999
PHD-BION-A: Bioengineering, PhD—Advanced Entry	Bioengineering	149999
BSBIOE-BEBC: Bioengineering and Biochemistry, BSBioE	Bioengineering/Biochemistry	149999
CERTG-BINF: Bioinformatics, Graduate Certificate	Bioinformatics	261103
MS-BINF: Bioinformatics, MS	Bioinformatics	261103
P-BS-BIOS: Biological Science, BS	Biological Science	260101
BS-BIOL: Biology, BS	Biology	260101
MS-BIOL: Biology, MS	Biology	260101
PHD-BIOL: Biology, PhD	Biology	260101
PHD-BIOL-A: Biology, PhD-Advanced Entry	Biology	260101

BS-BENG: Biology and English, BS	Biology/English	269999
BS-BIMA: Biology and Mathematics, BS	Biology/Mathematics	260101
BS-BIPO: Biology and Political Science, BS	Biology/Political Science	269999
BS-BIMP: Biomedical Physics, BS	Biomedical Physics	260203
MS-BIOM: Biomedical Science, MS	Biomedical Science	260102
PHD-BIOM: Biomedical Science, PhD	Biomedical Science	260102
PHD-BIOM-A: Biomedical Science, PhD— Advanced Entry	Biomedical Science	260102
CERTG-BIAS: Biopharmaceutical Analytical Sciences, Graduate Certificate	Biopharm Analytical Sci	400599
P-CERTG-BPRA: Biopharmaceutical Regulatory Affairs, Graduate Certificate	Biopharmaceutical Reg Affairs	512099
P-CERTG-BPQI: International Biopharmaceutical Regulatory Affairs, Graduate Certificate	Biopharmacy Quality Intl	512099
PHD-BPHY: Biophysics, PhD	Biophysics	260203
CERTG-BIOT: Biotechnology, Graduate Certificate	Biotechnology	261201
MS-BIOT-SC: Biotechnology, MS	Biotechnology	261201
P-BS-BIOT: Biotechnology, BS	Biotechnology	261201
CERTG-BITE: Biotechnology Enterprise, Graduate Certificate	Biotechnology Enterprise	261201
CERTG-RESC: Biotechnology Regulatory Science, Graduate Certificate	Biotechnology Regulatory Sci	512004
CERTG-BLCE: Blockchain and Smart Contract Engineering, Graduate Certificate	Blockchain Smart Contr. Engr	140903
CERTG-BMGT: Brand Management, Graduate Certificate	Brand Management	521401
CERTG-TBWS: Broadband Wireless Systems, Graduate Certificate	Broadband Wireless Systems	110901
BS-BALW: Business Administration and Law, BS	Business Admin and Law	520101
BS-BACS: Business Administration and Communication Studies, BS	Business Admin/Comm Studies	520101
BS-BACJ: Business Administration and Criminal Justice, BS	Business Admin/Crim Justice	520101
BS-BAPS: Business Administration and Psychology, BS	Business Admin/Psychology	520101
BS-BAPH: Business Administration and Public Health, BS	Business Admin/Public Health	520101
BSBA-BSAD: Business Administration, BSBA	Business Administration	520101
CERTG-BSAD: Business Administration, Graduate Certificate	Business Administration	520101
CERTG-BSAD-O: Business Administration—Online Program, Graduate Certificate	Business Administration	520101
MBA-BSAD-E: Business Administration, MBA— Part-Time	Business Administration	520101
MBA-BSAD-F: Business Administration, MBA— Full-Time	Business Administration	520101
MBA-BSAD2-O: Business Administration, MBA— Online	Business Administration	520101
BS-BUDE: Business Administration and Design, BS	Business Administration/Design	520101
CERTG-BUSA: Business Analytics, Graduate Certificate	Business Analytics	521302
MS-BUSA: Business Analytics, MS	Business Analytics	521302
MS-BUSA-O: Business Analytics, MS—Online	Business Analytics	521302
CERTG-BLAW: Business Law, Graduate Certificate	Business Law	220205
CERTG-HECA: Business Management for Healthcare, Graduate Certificate	Business Mgmt for Healthcare	521099

CERTG-CNCS: Cannabis Science, Graduate Certificate	Cannabis Science	513399
MS-CGTH: Cell and Gene Therapies, MS	Cell and Gene Therapies	260806
BS-CMBI: Cell and Molecular Biology, BS	Cell and Molecular Biology	260406
BSCHE-CEBE: Chemical Engineering and Bioengineering, BSChE	Chem Engineer/Bioengineering	140701
BSCHE-CHOC: Chemical Engineering and Biochemistry, BSChE	Chem Engineering/Biochemistry	140701
BSCHE-CHME: Chemical Engineering, BSChE	Chemical Engineering	140701
MSCHE-CHME: Chemical Engineering, MSChE	Chemical Engineering	140701
PHD-CHME: Chemical Engineering, PhD	Chemical Engineering	140701
PHD-CHME-A: Chemical Engineering, PhD—Advanced Entry	Chemical Engineering	140701
BSCHE-CHCS: Chemical Engineering and Computer Science, BSChE	Chemical Engineering/Comp Sci	140701
BSCHE-CEDS: Chemical Engineering and Data Science, BSChE	Chemical Engineering/Data Sci	140701
BSCHE-CEPH: Chemical Engineering and Physics, BSChE	Chemical Engineering/Physics	140701
BSCHE-CEEE: Chemical Engineering and Environmental Engineering, BSChE	Chemical Engr/Environ Engr	140701
BS-CHEM: Chemistry, BS	Chemistry	400501
MS-CHEM: Chemistry, MS	Chemistry	400501
PHD-CHEM: Chemistry, PhD	Chemistry	400501
PHD-CHEM-A: Chemistry, PhD-Advanced Entry	Chemistry	400501
PHD-CEEN: Civil and Environmental Engineering, PhD	Civil Environmental Engineer	140801
PHD-CEEN-A: Civil and Environmental Engineering, PhD—Advanced Entry	Civil Environmental Engineer	140801
BSCE-CEAS: Civil Engineering and Architectural Studies, BSCE	Civil Eng/Arch Studies	140801
BSCE-CIVE: Civil Engineering, BSCE	Civil Engineering	140801
MSCIVE-CIVE: Civil Engineering, MSCivE	Civil Engineering	140801
BSCE-CVCS: Civil Engineering and Computer Science, BSCE	Civil Engineering/Computer Sci	140801
CERTG-CLEN: Climate and Engineering, Graduate Certificate	Climate and Engineering	141401
MS-CLSE: Climate Science and Engineering, MS	Climate Sci and Engineering	141401
P-CERTG-CCAM: Cloud Computing Application and Management, Graduate Certificate	Cloud Computing App and Mgmt	110104
P-CERTG-CATH: Collegiate Athletics Administration, Graduate Certificate	Collegiate Athletics Admin	310504
BS-CMSL: Communication Studies and Speech-Language Pathology and Audiology	Comm Stud/Speech-Lang Path Aud	090101
BA-CMSO: Communication Studies and Sociology, BA	Comm Studies/Sociology	090199
BA-CMTH: Communication Studies and Theatre, BA	Comm Studies/Theatre	090199
P-MS-COED: Commerce and Economic Development, MS	Commerce and Economic Dvlpmnt	450603
BA-CMME: Communication and Media Studies, BA	Communication Media Studies	090199
BA-CMST: Communication Studies, BA	Communication Studies	090101
BS-CMDE: Communication Studies and Design, BS	Communication Studies/Design	090101
BS-CSBA: Computer Science and Business Administration, BS	Comp Sci/Business Admin	110101

BS-CSCP: Computer Science and Cognitive Psychology, BS	Comp Sci/Cognitive Psyc	110101
BS-CSES: Computer Science and Environmental and Sustainability Sciences, BS	Comp Sci/Environ and Sust Sci	110101
BS-CSMA: Computer Science and Mathematics, BS	Comp Sci/Mathematics	110101
BS-CSPP: Computer Science and Politics, Philosophy, and Economics, BS	Comp Sci/Politics, Phil Econ	110101
BS-CSSL: Computer Science and Speech-Language Pathology and Audiology, BS	Comp Sci/Speech-Lng Pth Aud	110101
MS-CNAN: Complex Network Analysis, MS	Complex Network Analysis	300601
CERTG-COSS: Computational Social Science, Graduate Certificate	Computational Social Science	305202
BSCMPE-CMPE: Computer Engineering, BSCmpE	Computer Engineering	140901
PHD-CMPE: Computer Engineering, PhD	Computer Engineering	140901
PHD-CMPE-A: Computer Engineering, PhD-Advanced Entry	Computer Engineering	140901
BSCMPE-CMPH: Computer Engineering and Physics, BSCmpE	Computer Engineering/Physics	140901
BSCMPE-CECS: Computer Engineering and Computer Science, BSCmpE	Computer Engr/Computer Science	140901
BS-CSBN: Computer Science and Behavioral Neuroscience, BS	Computer Sci/Behavior Neurosci	110101
BS-CSCS: Computer Science and Communication Studies, BS	Computer Sci/Communication Stu	110101
BS-CSCJ: Computer Science and Criminal Justice, BS	Computer Sci/Criminal Justice	110101
BS-CGDV: Computer Science and Game Development, BS	Computer Sci/Game Development	110101
BS-CSHL: Computer Science and Health Science, BS	Computer Sci/Health Sci	110101
BS-CSMU: Computer Science and Music, BS	Computer Sci/Music	110101
BS-CSMU-MUTE: Computer Science and Music with Concentration in Music Technology, BS	Computer Sci/Music	110101
BS-CSPL: Computer Science and Philosophy, BS	Computer Sci/Philosophy	110101
BS-CSPY: Computer Science and Physics, BS	Computer Sci/Physics	110101
BS-CSPO: Computer Science and Political Science, BS	Computer Sci/Political Sci	110101
BS-CSSO: Computer Science and Sociology, BS	Computer Sci/Sociology	110101
BACS-CSCI: Computer Science, BACS	Computer Science	110101
BSCS-CSCI: Computer Science, BSCS	Computer Science	110101
CERTG-CSCI: Computer Science, Graduate Certificate	Computer Science	110101
MSCS-CSCI: Computer Science, MSCS	Computer Science	110101
MSCS-CSCI-AL: Computer Science, MSCS—Align	Computer Science	110101
PHD-CSCI: Computer Science, PhD	Computer Science	110101
PHD-CSCI-A: Computer Science, PhD—Advanced Entry	Computer Science	110101
BS-CSBI: Computer Science and Biology, BS	Computer Science/Biology	110101
BS-CSDE: Computer Science and Design, BS	Computer Science/Design	110101
BS-CSEC: Computer Science and Economics, BS	Computer Science/Economics	110101
BS-CSEG: Computer Science and English, BS	Computer Science/English	110101
BS-CSHI: Computer Science and History, BS	Computer Science/History	110101
BS-CSJO: Computer Science and Journalism, BS	Computer Science/Journalism	110101
BS-CSLI: Computer Science and Linguistics, BS	Computer Science/Linguistics	110101
BS-CSME: Computer Science and Media Arts, BS	Computer Science/Media Arts	110101

BS-CSPH: Computer Science and Public Health, BS	Computer Science/Public Health	110101
BS-CSTH: Computer Science and Theatre, BS	Computer Science/Theatre	110101
BS-CPLW: Computing and Law, BS	Computing and Law	110101
P-CERTG-CONM: Construction Management, Graduate Certificate	Construction Management	460412
P-MS-CORC: Corporate and Organizational Communication, MS	Corporate Org Communication	090101
CERTG-COFN: Corporate Finance, Graduate Certificate	Corporate Finance	520801
CERTG-COIN: Corporate Innovation, Graduate Certificate	Corporate Innovation	520210
CERTG-CPRN: Corporate Renewal, Graduate Certificate	Corporate Renewal	520799
MSCP-COPS: Counseling Psychology, MSCP	Counseling Psychology	422803
PHD-COPS-MSE: Counseling Psychology, PhD	Counseling Psychology	422803
MS-CCMD: Creative Collaboration and Multidisciplinary Design, MS	Creatv Collab Multidisc Dsgn	501099
CERTG-CRAM: Crime Analysis and Mapping, Graduate Certificate	Crime Analysis and Mapping	430408
BS-CRJO: Criminal Justice and Journalism, BS	Criminal Justice/Journalism	430104
BS-CJPH: Criminal Justice and Philosophy, BS	Criminal Justice/Philosophy	430104
BS-CRPO: Criminal Justice and Political Science, BS	Criminal Justice/Political Sci	430104
BS-CJPS: Criminal Justice and Psychology, BS	Criminal Justice/Psychology	430199
BS-CJPB: Criminal Justice and Public Health, BS	Criminal Justice/Public Health	430104
BS-CRSO: Criminal Justice and Sociology, BS	Criminal Justice/Sociology	430104
BS-CRCJ: Criminology and Criminal Justice, BS	Criminology Criminal Justice	430104
MS-CRCJ: Criminology and Criminal Justice, MS	Criminology Criminal Justice	430104
PHD-CRJP: Criminology and Justice Policy, PhD	Criminology and Justice Policy	430104
PHD-CRJP-A: Criminology and Justice Policy, PhD—Advanced Entry	Criminology and Justice Policy	430104
P-CERTG-CCCM: Cross-Cultural Communication, Graduate Certificate	Cross-Cultural Communication	090100
MS-CDSC: Cross-Disciplinary Science, MS	Cross-Disciplinary Science	300101
BA-CAPH: Cultural Anthropology and Philosophy, BA	Cultural Anthro/Philosophy	450204
BA-CARS: Cultural Anthropology and Religious Studies, BA	Cultural Anthro/Religious Stud	450204
BA-CUAN: Cultural Anthropology, BA	Cultural Anthropology	451101
BS-CUAN: Cultural Anthropology, BS	Cultural Anthropology	451101
BA-CUTH: Cultural Anthropology and Theatre, BA	Cultural Anthropology/Theatre	451101
CERTG-CUEN: Cultural Entrepreneurship, Graduate Certificate	Cultural Entrepreneurship	501099
MS-CYPS: Cyber-Physical Systems, MS	Cyber-Physical Systems	140903
BS-CYBS: Cybersecurity, BS	Cybersecurity	111003
CERTG-CYBS: Cybersecurity, Graduate Certificate	Cybersecurity	111003
MS-CYBS: Cybersecurity, MS	Cybersecurity	111003
MS-CYBS-AL: Cybersecurity, MS—Align	Cybersecurity	111003
PHD-CYBS: Cybersecurity, PhD	Cybersecurity	111003
PHD-CYBS-A: Cybersecurity, PhD—Advanced Entry	Cybersecurity	111003
BS-CYBB: Cybersecurity and Business Administration, BS	Cybersecurity/Business Admin	111003
BS-CYCJ: Cybersecurity and Criminal Justice, BS	Cybersecurity/Criminal Justice	111003
BS-CYEC: Cybersecurity and Economics, BS	Cybersecurity/Economics	111003

CERTG-DAAN: Data Analytics, Graduate Certificate	Data Analytics	110802
CERTG-DAAE: Data Analytics Engineering, Graduate Certificate	Data Analytics Engineering	149999
CERTG-DAAE-O: Data Analytics Engineering, Graduate Certificate—Online	Data Analytics Engineering	149999
MS-DAAE: Data Analytics Engineering, MS	Data Analytics Engineering	149999
MS-DAAE-O: Data Analytics Engineering, MS—Online	Data Analytics Engineering	149999
MS-DAMG: Data Architecture and Management, MS	Data Architecture Management	110802
BS-DSEE: Data Science and Ecology and Evolutionary Biology, BS	Data Sci/Ecology Evol Bio	110802
BS-DSES: Data Science and Environmental and Sustainability Sciences, BS	Data Sci/Environ and Sust Sci	110802
BS-DSSL: Data Science and Speech-Language Pathology and Audiology, BS	Data Sci/Speech-Lng Pth Aud	110802
BS-DASC: Data Science, BS	Data Science	110802
MS-DASC: Data Science, MS	Data Science	110802
MS-DASC-AL: Data Science, MS—Align	Data Science	110802
BS-DSBN: Data Science and Behavioral Neuroscience, BS	Data Science/Behavioral Neuro	110802
BS-DSBC: Data Science and Biochemistry, BS	Data Science/Biochemistry	110802
BS-DSBL: Data Science and Biology, BS	Data Science/Biology	110802
BS-DSBA: Data Science and Business Administration, BS	Data Science/Business Admin	110802
BS-DSCH: Data Science and Chemistry, BS	Data Science/Chemistry	110802
BS-DSCM: Data Science and Communication Studies, BS	Data Science/Comm Studies	110802
BS-DSCJ: Data Science and Criminal Justice, BS	Data Science/Criminal Justice	110802
BS-DSDE: Data Science and Design, BS	Data Science/Design	110802
BS-DSEC: Data Science and Economics, BS	Data Science/Economics	110802
BS-DSHS: Data Science and Health Science, BS	Data Science/Health Science	110802
BS-DSIA: Data Science and International Affairs, BS	Data Science/Intl Affairs	110802
BS-DSJO: Data Science and Journalism, BS	Data Science/Journalism	110802
BS-DSLI: Data Science and Linguistics, BS	Data Science/Linguistics	110802
BS-DSMA: Data Science and Mathematics, BS	Data Science/Mathematics	110802
BS-DSPL: Data Science and Philosophy, BS	Data Science/Philosophy	110802
BS-DSPH: Data Science and Physics, BS	Data Science/Physics	110802
BS-DSPS: Data Science and Psychology, BS	Data Science/Psychology	110802
BS-DSPB: Data Science and Public Health, BS	Data Science/Public Health	110802
BS-DSSO: Data Science and Sociology, BS	Data Science/Sociology	110802
BFA-DESN: Design, BFA	Design	500409
BS-DEMA: Design and Mathematics, BS	Design/Mathematics	500409
BS-DEPH: Design and Public Health, BS	Design/Public Health	500409
BS-DETH: Design and Theatre, BS	Design/Theatre	500409
CERTG-DPSI: Digital Platforms for Service Innovation, Graduate Certificate	Dgtl Pltfrms for Service Innov	110899
P-BS-DIME: Digital Communication and Media, BS	Digital Communication Media	090702
CERTG-DHUM: Digital Humanities, Graduate Certificate	Digital Humanities	240103
P-MPS-DGM-AL: Digital Media, MPS—Connect	Digital Media	090702
P-MPS-DGME: Digital Media, MPS	Digital Media	090702

P-CERTG-DGMM: Digital Media Management, Graduate Certificate	Digital Media Management	100105
P-CERTG-DGVD: Digital Video, Graduate Certificate	Digital Video	500602
MA-ECED: Early Childhood Education, MA	Early Childhood Education	131210
CERTG-EINT: Early Intervention, Graduate Certificate	Early Intervention	131099
BS-EEBI: Ecology and Evolutionary Biology, BS	Ecology Evolutionary Biology	261310
BA-ECON: Economics, BA	Economics	450603
BS-ECON: Economics, BS	Economics	450603
MS-ECON: Economics, MS	Economics	450603
PHD-ECON: Economics, PhD	Economics	450603
PHD-ECON-A: Economics, PhD—Advanced Entry	Economics	450603
BS-ECBA: Economics and Business Administration, BS	Economics/Business Admin	450603
BS-ECCJ: Economics and Criminal Justice, BS	Economics/Criminal Justice	450603
BS-ECHS: Economics and Human Services, BS	Economics/Human Services	450603
BS-ECIB: Economics and International Business, BS	Economics/Intl Business	450603
BS-ECJO: Economics and Journalism, BS	Economics/Journalism	450603
BS-ECMA: Economics and Mathematics, BS	Economics/Mathematics	450603
BS-ECPH: Economics and Philosophy, BS	Economics/Philosophy	450603
BS-ECPS: Economics and Psychology, BS	Economics/Psychology	450603
P-EDD-EDUC: Education, EdD	Education	130101
P-MED-EDUC: Education, MEd	Education	130101
P-CAGS-EDLM: Education Leadership Management, CAGS	Education Leadership Mgmt	130401
MA-EDLD: Educational Leadership, MA	Educational Leadership	130401
MSECEL-ECEL: Electrical and Computer Engineering Leadership, MSECEL	Elec and Comp Engr Leadership	141001
BSCMPE-ELCE: Electrical and Computer Engineering, BSCmpE	Electrical and Computer Engr	141001
BSEE-ELCE: Electrical and Computer Engineering, BSEE	Electrical and Computer Engr	141001
BSEE-ELEE: Electrical Engineering, BSEE	Electrical Engineering	141001
MSECE-ELEE: Electrical and Computer Engineering, MSECE	Electrical Engineering	141001
PHD-ELEE: Electrical Engineering, PhD	Electrical Engineering	141001
PHD-ELEE-A: Electrical Engineering, PhD—Advanced Entry	Electrical Engineering	141001
BSEE-EEMU: Electrical Engineering and Music with Concentration in Music Technology, BSEE	Electrical Engineering/Music	141001
BSEE-EEPH: Electrical Engineering and Physics, BSEE	Electrical Engineering/Physics	141001
P-MAT-ELED: Elementary Education, MAT	Elementary Education	131202
CERTG-ENES: Energy Systems, Graduate Certificate	Energy Systems	142701
MSENEs-AL: Energy Systems, MSEneS—Academic Link	Energy Systems	142701
MSENEs-ENES: Energy Systems, MSEneS	Energy Systems	142701
CERTG-ENSY: Energy Systems Management, Graduate Certificate	Energy Systems Management	142701
MS-CEPP: Engineering and Public Policy, MS	Engineering and Public Policy	140899
CERTG-ENBU: Engineering Business, Graduate Certificate	Engineering Business	140101

CERTG-EEDM: Engineering Economic Decision Making, Graduate Certificate	Engineering Economic Decision	140101
CERTG-ENLR: Engineering Leadership, Graduate Certificate	Engineering Leadership	141001
CERTG-ENGM: Engineering Management, Graduate Certificate	Engineering Management	140101
MSEM-ENGM: Engineering Management, MSEM	Engineering Management	140101
MSEM-ENGM-O: Engineering Management, MSEM—Online	Engineering Management	140101
CERTG-ETSM: Technology Systems Management, Graduate Certificate	Engineering Tech Systems Mgmt	140101
BA-ENGL: English, BA	English	230101
MA-ENGL: English, MA	English	230101
PHD-ENGL: English, PhD	English	230101
PHD-ENGL-A: English, PhD—Advanced Entry	English	230101
BA-ENCO: English and Communication Studies, BA	English/Communication Studies	230101
BA-ENCJ: English and Criminal Justice, BA	English/Criminal Justice	230101
BA-ENCA: English and Cultural Anthropology, BA	English/Cultural Anthropology	230101
BA-ENDE: English and Design, BA	English/Design	230101
BA-EPHI: English and Philosophy, BA	English/Philosophy	230101
BA-ENPS: English and Political Science, BA	English/Political Science	230101
BA-ENTH: English and Theatre, BA	English/Theatre	230101
CERTG-ENTR: Entrepreneurship, Graduate Certificate	Entrepreneurship	520701
BS-ESJO: Environmental and Sustainability Sciences and Journalism, BS	Environ Sust Sci/Journalism	030104
BS-ESCH: Environmental and Sustainability Sciences and Chemistry, BS	Environ and Sust Sci/Chemistry	030104
BS-ESEC: Environmental and Sustainability Sciences and Economics, BS	Environ and Sust Sci/Economics	030104
BS-ESLA: Environmental and Sustainability Sciences and Landscape Architecture, BS	Environ and Sust Sci/Land Arch	030104
BSENVE-EECH: Environmental Engineering and Chemical Engineering, BSEnvE	Environ Engr/Chemical Engr	140801
BSENVE-ENVI: Environmental Engineering, BSEnvE	Environmental Engineering	140801
MSENVE-ENVI: Environmental Engineering, MSEnvE	Environmental Engineering	140801
BSENVE-EEDS: Environmental Engineering and Data Science, BSEnvE	Environmental Engr/Data Sci	140801
BSENVE-ENHS: Environmental Engineering and Health Science, BSEnvE	Environmental Engr/Health Sci	140801
MS-ENPP: Environmental Science and Policy, MS	Environmental Science Policy	030103
BA-ENVS: Environmental Studies, BA	Environmental Studies	030103
BS-ENSS: Environmental and Sustainability Sciences, BS	Environmtl Sustain Sciences	030104
BSENVE-EELA: Environmental Engineering and Landscape Architecture, BSEnvE	Environmtl Engr/Landscape Arch	140801
BA-ENHI: Environmental Studies and History, BA	Environmtl Studies/History	030103
BA-ENIA: Environmental Studies and International Affairs, BA	Environmtl Studies/Intl Affair	030103
BA-ENPH: Environmental Studies and Philosophy, BA	Environmtl Studies/Philosophy	030103
BA-ENPO: Environmental Studies and Political Science, BA	Environmtl Studies/Politic Sci	030103
P-CERTG-ESPT: eSports, Graduate Certificate	eSports	310504

CERTG-EXPD: Experience Design, Graduate Certificate	Experience Design	110105
MFA-EXPD: Experience Design, MFA	Experience Design	110105
MS-EXPD: Experience Design, MS	Experience Design	110105
CERTG-EPHD: Experiential PhD Leadership, Graduate Certificate	Experiential PhD Leadership	520210
P-CERTG-EXTL: Experiential Teaching and Learning, Graduate Certificate	Experiential Teach and Learn	130301
CERTG-EBIO: Experimental Biotechnology, Graduate Certificate	Experimental Biotechnology	261201
MS-EXRL: Extended Realities, MS	Extended Realities	110105
CERTG-EXMD: Extreme Medicine, Graduate Certificate	Extreme Medicine	519999
MSF-FINA: Finance, MSF	Finance	520801
P-BS-FIAM: Finance and Accounting Management, BS	Finance and Accounting Mgmt	520801
P-CERTG-FIMI: Financial Markets and Institutions, Graduate Certificate	Financial Mkts and Inst	520899
MS-FTMG: Management, MS with Major in Fintech Management	Fintech Management	307104
P-CERTG-FACC: Forensic Accounting, Graduate Certificate	Forensic Accounting	430406
P-CERTG-FDDV: Fundraising and Development, Graduate Certificate	Fundraising and Development	520206
BFA-GAAN: Game Art and Animation, BFA	Game Art and Animation	500605
BFA-GAME: Game Design, BFA	Game Design	100304
P-CERTG-GMDS: Game Design, Graduate Certificate	Game Design	100304
BS-GDMT: Game Design and Music with Concentration in Music Technology, BS	Game Design/Music	100304
CERTG-GMED: Game Experience Design, Graduate Certificate	Game Experience Design	100304
CERTG-GMSC: Game Science, Graduate Certificate	Game Science	100304
MS-GSAD: Game Science and Design, MS	Game Science and Design	100304
P-CERTG-GINT: Geographic Information Systems, Graduate Certificate	Geographic Information Tech	110103
BA-GLAS: Global Asian Studies, BA	Global Asian Studies	050103
CERTG-GLDR: Global Doctoral Research, Graduate Certificate	Global Doctoral Research	302001
P-CERTG-GSIR: Global Studies and International Relations, Graduate Certificate	Global Stu and Intl Relations	302001
P-MS-GSIR: Global Studies and International Relations, MS	Global Stu and Intl Relations	302001
MS-DAAH: Health Data Analytics, MS—Online	Health Data Analytics	512706
CERTG-HIME: Health Informatics Management and Exchange, Graduate Certificate	Health Info Mgmt Exchange	512706
MS-HEIN: Health Informatics, MS	Health Informatics	512706
MS-HEIN-O: Health Informatics, MS	Health Informatics	512706
CERTG-HLAW: Health Law, Graduate Certificate	Health Law	220208
CERTG-HLAP: Health Law and Policy, Graduate Certificate	Health Law and Policy	220208
BS-HLCJ: Health Science and Criminal Justice, BS	Health Sci/Criminal Justice	510799
BS-HLSC: Health Science, BS	Health Science	510799
P-BS-HLSC: Health Science, BS	Health Science	510799
BS-HSLW: Health Science and Law, BS	Health Science and Law	440503

BS-HSBA: Health Science and Business Administration, BS	Health Science/Business Admin	510799
BS-HLCM: Health Science and Communication Studies, BS	Health Science/Comm Studies	510799
BS-HSPS: Health Science and Psychology, BS	Health Science/Psychology	510799
BS-HSSO: Health Science and Sociology, BS	Health Science/Sociology	510799
BS-HSSP: Health Science and Spanish, BS	Health Science/Spanish	510799
P-BS-HCAD: Healthcare Administration, BS	Healthcare Administration	510701
P-CERTU-HCAD: Healthcare Administration, Undergraduate Certificate	Healthcare Administration	510701
CERTG-CLAW: Healthcare Compliance, Graduate Certificate	Healthcare Compliance	220208
DMSC-HCLD: Healthcare Leadership, DMSc	Healthcare Leadership	510701
P-CERTG-HEDA: Higher Education Administration, Graduate Certificate	Higher Education Admin	130406
P-MED-HEDA: Higher Education Administration, MEd	Higher Education Admin	130406
BA-HIST: History, BA	History	540101
BS-HIST: History, BS	History	540101
MA-HIST: History, MA	History	540101
PHD-HIST: History, PhD	History	540101
PHD-HIST-A: History, PhD—Advanced Entry	History	540101
BA-HICL: History, Culture, and Law, BA	History, Culture, and Law	220000
BA-HIAS: History and Asian Studies, BA	History/Asian Studies	540101
BA-HICJ: History and Criminal Justice, BA	History/Criminal Justice	540101
BA-HICA: History and Cultural Anthropology, BA	History/Cultural Anthropol	540101
BA-HIEC: History and Economics, BA	History/Economics	540101
BS-HIEC: History and Economics, BS	History/Economics	540101
BA-HIEN: History and English, BA	History/English	540101
BA-HIPH: History and Philosophy, BA	History/Philosophy	540101
BA-HIPS: History and Political Science, BA	History/Political Science	540101
BA-HIRS: History and Religious Studies, BA	History/Religious Studies	540101
BS-HHHS: Health Humanities and Health Science, BS	Hlth Humanities/Hlth Science	513204
BA-HHPH: Health Humanities and Public Health, BA	Hlth Humanities/Public Hlth	513204
PHD-HBSS: Human Behavior and Sustainability Sciences, PhD	Human Behavior and Sustain Sci	300601
MS-HUFA: Human Factors, MS	Human Factors	142701
MS-HMRS: Human Movement and Rehabilitation Sciences, MS	Human Movement Rehab Science	512314
PHD-HMRS: Human Movement and Rehabilitation Sciences, PhD	Human Movement Rehab Science	512314
PHD-HMRS-A: Human Movement and Rehabilitation Sciences, PhD—Advanced Entry	Human Movement Rehab Science	512314
CERTG-HURL: Human Resources Law, Graduate Certificate	Human Resources Law	220299
P-CERTG-HRMG: Human Resources Management, Graduate Certificate	Human Resources Management	521001
P-MS-HRMG: Human Resources Management, MS	Human Resources Management	521001
CERTG-HMRL: Human Rights Law, Graduate Certificate	Human Rights Law	220209
BA-HSVC: Human Services, BA	Human Services	440000
BS-HSVC: Human Services, BS	Human Services	440000

BA-HSCM: Human Services and Communication Studies, BA	Human Services/Comm Studies	440000
BS-HSCJ: Human Services and Criminal Justice, BS	Human Services/Crim Justice	430199
BA-HSIA: Human Services and International Affairs, BA	Human Services/Intl Affairs	440000
BS-HUPS: Human Services and Psychology, BS	Human Services/Psychology	440000
BA-HSPH: Human Services and Public Health, BA	Human Services/Public Health	440000
BA-HUSO: Human Services and Sociology, BA	Human Services/Sociology	449999
BS-HUSO: Human Services and Sociology, BS	Human Services/Sociology	449999
P-CERTG-HUIN: Human-Centered Informatics, Graduate Certificate	Human-Centered Informatics	110104
CERTG-ICSE: Inclusive Computer Science Education, Graduate Certificate	Inclusive Computer Sci Educ	131321
BSIE-INDE: Industrial Engineering, BSIE	Industrial Engineering	143501
MSIE-INDE: Industrial Engineering, MSIE	Industrial Engineering	143501
PHD-INDE: Industrial Engineering, PhD	Industrial Engineering	143501
PHD-INDE-A: Industrial Engineering, PhD—Advanced Entry	Industrial Engineering	143501
BSIE-IEBA: Industrial Engineering and Business Administration, BSIE	Industrial Engr/Business Admin	143501
BSIE-IECS: Industrial Engineering and Computer Science, BSIE	Industrial Engr/Computer Sci	143501
CERTG-IDEV: Information Design and Visualization, Graduate Certificate	Info Design and Visualization	500401
MFA-IDDV: Information Design and Data Visualization, MFA	Info Dsgn Data Visualization	303101
MS-IDDV: Information Design and Data Visualization, MS	Info Dsgn Data Visualization	303101
P-CERTG-INSM: Information Security Management, Graduate Certificate	Info Security Management	439999
P-MPS-INFM: Informatics, MPS	Informatics	110104
CERTG-INET: Information Ethics, Graduate Certificate	Information Ethics	380104
MSIS-INSY: Information Systems, MSIS	Information Systems	140903
MSIS-INSY-B: Information Systems, MSIS—Bridge	Information Systems	140903
MSIS-INSY-O: Information Systems, MSIS—Online	Information Systems	140903
MSIS-IS-B-O: Information Systems, MSIS—Bridge—Online	Information Systems	140903
P-BS-INFT: Information Technology, BS	Information Technology	110103
P-CERTG-IAMG: Insurance Analytics and Management, Graduate Certificate	Insurance Analytics and Mgmt	521701
P-MPS-IAMG: Insurance Analytics and Management, MPS	Insurance Analytics and Mgmt	521701
CERTG-PLAW: Intellectual Property Law, Graduate Certificate	Intellectual Property Law	220212
P-CERTG-INDS: Interactive Design, Graduate Certificate	Interactive Design	110801
PHD-INTY: Interdisciplinary, PhD	Interdisciplinary	300000
PHD-INTY-A: Interdisciplinary, PhD—Advanced Entry	Interdisciplinary	300000
PHD-IDSM: Interdisciplinary Design and Media, PhD	Interdisciplinary Dsgn Media	500401
PHD-IDSM-A: Interdisciplinary Design and Media, PhD—Advanced Entry	Interdisciplinary Dsgn Media	500401
PHD-INTE: Interdisciplinary Engineering, PhD	Interdisciplinary Engineering	140101

PHD-INTE-A: Interdisciplinary Engineering, PhD— Advanced Entry	Interdisciplinary Engineering	140101
BS-INST: Interdisciplinary Studies, BS	Interdisciplinary Studies	240101
P-BS-INST: Interdisciplinary Studies, BS	Interdisciplinary Studies	240101
BA-INAF: International Affairs with African Studies Concentration, BA	International Affairs	450901
MA-INAF: International Affairs, MA	International Affairs	450901
BA-IAHI: International Affairs and History, BA	International Affairs/History	450901
BSIB-INBU-NX: International Business, BSIB	International Business	521101
BSIB-INBU-X: International Business, BSIB	International Business	521101
CERTG-INBU: International Business, Graduate Certificate	International Business	521101
MS-INMA: International Management, MS	International Management	520101
MS-INOT: Internet of Things, MS	Internet of Things	140999
BA-IARS: International Affairs and Religious Studies, BA	Interntl Affairs/Religious Stu	450901
BA-IACJ: International Affairs and Criminal Justice, BA	Intl Affairs/Criminal Justice	450901
BA-IACA: International Affairs and Cultural Anthropology, BA	Intl Affairs/Cultural Anthro	450901
BA-IAEC: International Affairs and Economics, BA	Intl Affairs/Economics	450604
BS-IAIB: International Affairs and International Business, BS	Intl Affairs/Intl Business	450901
CERTG-INV: Investments, Graduate Certificate	Investments	520807
CERTG-TIPS: IP Telephony Systems, Graduate Certificate	IP/Telephony Systems	110901
BA-JESR: Jewish Studies and Religion, BA	Jewish Studies/Religion	380206
BA-JOUR: Journalism, BA	Journalism	090401
MA-JOUR: Journalism, MA	Journalism	090401
BA-JOCM: Journalism and Communication Studies, BA	Journalism/Comm Studies	090401
BA-JOCA: Journalism and Cultural Anthropology, BA	Journalism/Cultural Anthro	090401
BS-JODE: Journalism and Design, BS	Journalism/Design	090401
BA-JOEN: Journalism and English, BA	Journalism/English	090401
BA-JOIA: Journalism and International Affairs, BA	Journalism/Intl Affairs	090401
BA-JOPO: Journalism and Political Science, BA	Journalism/Political Science	090401
BA-JOSO: Journalism and Sociology, BA	Journalism/Sociology	090401
BLA-LARC: Landscape Architecture, BLA	Landscape Architecture	040601
JD-LAW: Law, JD	Law	220101
JD-LAW-P: Law, JD—Part-Time Program	Law	220101
LLM-LAW: Law, LLM—Experiential	Law	220101
LLM-LAW-O: Law, LLM—Online	Law	220101
LLM-LAW-T: Law, LLM	Law	220101
P-DLP-LAPO: Law and Policy, DLP	Law and Policy	229999
P-CERTG-LEAD: Leadership, Graduate Certificate	Leadership	520213
CERTG-LEPO: Leading People and Organizations, Graduate Certificate	Leading People Organizations	521099
P-CERTG-PMTE: Leading and Managing Technical Projects, Graduate Certificate	Leadng Managng Tech Projects	520211
CERTG-LEAN: Lean Six Sigma, Graduate Certificate	Lean Six Sigma	140101
P-CERTG-LXDT: Learning Experience Design and Technology, Graduate Certificate	Learning Exp Design Tech	130501
P-MPS-LXDT: Learning Experience Design and Technology, MPS	Learning Exp Design Tech	130501

CERTG-LEDS: Legal Design, Graduate Certificate	Legal Design	220299
MLS-LEGS: Legal Studies, MLS—Online	Legal Studies	229999
BS-LING: Linguistics, BS	Linguistics	160102
BA-LICS: Linguistics and Communication Studies, BA	Linguistics/Comm Studies	160102
BS-LICA: Linguistics and Cultural Anthropology, BS	Linguistics/Cultural Anthro	450204
BA-LIEN: Linguistics and English, BA	Linguistics/English	160102
BS-LIPS: Linguistics and Psychology, BS	Linguistics/Psychology	160102
BS-LISL: Linguistics and Speech-Language Pathology and Audiology, BS	Linguistics/Speech-Lng Pth Aud	160102
MS-MGMT: Management, MS	Management	520201
P-BS-MGMT: Management, BS	Management	520201
CERTG-MQOB: Manufacturing and Quality Operations in Biotechnology, Graduate Certificate	Manuf Qual Oper in Biotech	512010
MS-MRES: Marine and Environmental Sciences, MS	Marine Environment Sciences	030104
PHD-MRES: Marine and Environmental Sciences, PhD	Marine Environment Sciences	030104
PHD-MRES-A: Marine and Environmental Sciences, PhD—Advanced Entry	Marine Environment Sciences	030104
BS-MARB: Marine Biology, BS	Marine Biology	261302
BS-MARB3: Marine Biology, BS with Three Seas	Marine Biology	261302
MS-MARB: Marine Biology, MS	Marine Biology	261302
CERTG-MKTG: Marketing, Graduate Certificate	Marketing	521401
CERTG-MKAN: Marketing Analytics, Graduate Certificate	Marketing Analytics	521402
BA-MATH: Mathematics, BA	Mathematics	270101
BS-MATH: Mathematics, BS	Mathematics	270101
MS-MATH: Mathematics, MS	Mathematics	270101
PHD-MATH: Mathematics, PhD	Mathematics	270101
PHD-MATH-A: Mathematics, PhD—Advanced Entry	Mathematics	270101
BS-MABA: Mathematics and Business Administration, BS	Mathematics/Business Admin	270101
BS-MAPL: Mathematics and Philosophy, BS	Mathematics/Philosophy	270101
BS-MAPH: Mathematics and Physics, BS	Mathematics/Physics	270101
BS-MAPO: Mathematics and Political Science, BS	Mathematics/Political Science	270101
BS-MAPY: Mathematics and Psychology, BS	Mathematics/Psychology	270101
BS-MASO: Mathematics and Sociology, BS	Mathematics/Sociology	270101
BSME-MECE: Mechanical Engineering, BSME	Mechanical Engineering	141901
MSME-MECE: Mechanical Engineering, MSME	Mechanical Engineering	141901
PHD-MECE: Mechanical Engineering, PhD	Mechanical Engineering	141901
PHD-MECE-A: Mechanical Engineering, PhD—Advanced Entry	Mechanical Engineering	141901
BSME-MEDS: Mechanical Engineering and Design, BSME	Mechanical Engineering/Design	141901
BSME-MEHI: Mechanical Engineering and History, BSME	Mechanical Engineering/History	141901
BSME-MEPH: Mechanical Engineering and Physics, BSME	Mechanical Engineering/Physics	141901
BSME-MEBE: Mechanical Engineering and Bioengineering, BSME	Mechanical Engr/Bioengineering	141901
BSME-MECS: Mechanical Engineering and Computer Science, BSME	Mechanical Engr/Computer Sci	141901
P-BS-MTRO: Mechatronics, BS	Mechatronics	144201

BA-MSPH: Media and Screen Studies and Philosophy, BA	Media Screen Stud/Philosophy	090199
BA-MSHI: Media and Screen Studies and History, BA	Media Screen Studies/History	090199
MS-MEDA: Media Advocacy, MS	Media Advocacy	099999
BA-MSST: Media and Screen Studies, BA	Media and Screen Studies	090199
BFA-MART: Media Arts, BFA	Media Arts	500102
BA-MACM: Media Arts and Communication Studies, BA	Media Arts/Comm Studies	500102
MS-MIDC: Media Innovation and Data Communication, MS	Media Innovation and Data Comm	090702
BA-MSJO: Media and Screen Studies and Journalism, BA	Media Screen Stu/Journalism	090199
BA-MSPO: Media and Screen Studies and Political Science, BA	Media Screen Stu/Political Sci	090199
BA-MSSO: Media and Screen Studies and Sociology, BA	Media Screen Stu/Sociology	090199
BA-MSTH: Media and Screen Studies and Theatre, BA	Media Screen Stu/Theatre	090199
BS-MSTH: Media and Screen Studies and Theatre, BS	Media Screen Stu/Theatre	090199
BA-MSMA: Media and Screen Studies and Media Arts, BA	Media Screen Stud./Media Arts	090199
BA-MSEN: Media and Screen Studies and English, BA	Media Screen Studies/English	090199
MS-MTET: Media, Technology, and Ethics, MS	Media, Technology, and Ethics	090702
P-CERTG-MDRA: Medical Device Regulatory Affairs, Graduate Certificate	Medical Device Regulatory Aff.	512799
CERTG-MSWE: Medical Software Engineering, Graduate Certificate	Medical Software Engineering	512706
MS-MCDD: Medicinal Chemistry Drug Discovery, MS	Medicinal Chem Drug Discov	512004
PHD-MCDD: Medicinal Chemistry and Drug Discovery, PhD	Medicinal Chem Drug Discov	512004
PHD-MCDD-A: Medicinal Chemistry and Drug Discovery, PhD—Advanced Entry	Medicinal Chem Drug Discov	512004
CERTG-MOBI: Molecular Biotechnology, Graduate Certificate	Molecular Biotechnology	261201
MA-MSED: Multiple Subject Education, MA	Multiple Subject Education	131202
BA-MUSI: Music, BA	Music	500901
BS-MUSI-MUID: Music with Concentration in Music Industry, BS	Music	500901
BS-MUSI-MUTE: Music with Concentration in Music Technology, BS	Music	500901
BS-MUBA: Music and Business Administration with Concentration in Music Industry, BS	Music/Business Administration	500901
BS-MUCM: Music and Communication Studies with Concentration in Music Industry, BS	Music/Communication Studies	500901
CERTG-MFMG: Mutual Fund Management, Graduate Certificate	Mutual Fund Management	520807
CERTG-NNMD: Nanomedicine, Graduate Certificate	Nanomedicine	300101
MS-NNMD: Nanomedicine, MS	Nanomedicine	300101
MS-NETS: Network Science, MS	Network Science	300601
PHD-NETS: Network Science, PhD	Network Science	300601
P-CERTG-NCBR: Nonclinical Biomedical Product Regulation, Graduate Certificate	Nonclinical Biomed Product Reg	512002

CERTG-NPSC: Nonprofit Sector, Philanthropy, and Social Change, Graduate Certificate	Nonprof-Philanth-Social Change	520206
P-CERTG-NPMG: Nonprofit Management, Graduate Certificate	Nonprofit Management	520206
P-MS-NPMG: Nonprofit Management, MS	Nonprofit Management	520206
DNP-NUAN: Nurse Anesthesia, DNP	Nurse Anesthesia	513804
BSN-NURS: Nursing, BSN	Nursing	513801
BSN-NURS-2: Nursing, BSN—Accelerated Program for Second-Degree Students	Nursing	513801
BSN-NURS-T: Nursing, BSN—Transfer Track	Nursing	513801
CAGS-CCAC: Nursing—Adult-Gerontology Nurse Practitioner, Acute Care, CAGS	Nursing	513801
CAGS-CCNN: Nursing—Neonatal Nurse Practitioner, CAGS	Nursing	513801
CAGS-PCAN: Nursing—Adult-Gerontology Nurse Practitioner, Primary Care, CAGS	Nursing	513801
CAGS-PEAC: Nursing—Pediatric Nurse Practitioner, Acute Care, CAGS	Nursing	513801
CAGS-PEPA: Nursing—Pediatric Nurse Practitioner, Acute and Primary Care, CAGS	Nursing	513801
CAGS-PEPC: Nursing—Pediatric Nurse Practitioner, Primary Care, CAGS	Nursing	513801
CAGS-PSMH: Nursing—Psychiatric-Mental Health Nurse Practitioner, CAGS	Nursing	513801
DNP-NURS: Nursing, DNP—Post-Master's	Nursing	513801
DNP-NURS-BSE: Nursing, DNP	Nursing	513801
MS-NURS: Nursing, MS	Nursing	513801
MS-NURS-DE: Nursing, MS—Direct Entry	Nursing	513801
PHD-NURS: Nursing, PhD	Nursing	513801
PHD-NURS-MSE: Nursing, PhD—Advanced Entry	Nursing	513801
MS-NULD: Nursing Leadership, MS	Nursing Leadership	513802
CERTG-OMIC: Omics, Graduate Certificate	Omics	261103
MSOR-OPRE: Operations Research, MSOR	Operations Research	143701
MSOR-OPRE-AS: Operations Research, MSOR	Operations Research	143701
CERTG-ORCM-O: Organizational Communication, Graduate Certificate—Online	Organizational Communication	090901
P-CERTG-ORGC: Organizational Communication, Graduate Certificate	Organizational Communication	090101
P-MS-ORLD: Organizational Leadership, MS	Organizational Leadership	520213
CERTG-PTSF: Patient Safety, Graduate Certificate	Patient Safety	512213
CERTG-PEAC: Pediatric Nurse Practitioner, Acute Care, Graduate Certificate	Pediatric Acute Care PNP	513814
BS-PFER: Performance and Extended Realities, BS	Performance and Ext Realities	100304
PHD-PHEI: Personal Health Informatics, PhD	Personal Health Informatics	512706
MS-PHEN: Pharmaceutical Engineering, MS	Pharmaceutical Engineering	140702
BS-PHSC: Pharmaceutical Sciences, BS	Pharmaceutical Sciences	512010
CERTG-PHTE: Pharmaceutical Technologies, Graduate Certificate	Pharmaceutical Technologies	261201
MS-PHDD: Pharmaceutics and Drug Delivery, MS	Pharmaceutics Drug Delivery	512010
PHD-PHDD: Pharmaceutics and Drug Delivery, PhD	Pharmaceutics Drug Delivery	512010
PHD-PHDD-A: Pharmaceutics and Drug Delivery, PhD—Advanced Entry	Pharmaceutics Drug Delivery	512010
MS-PHAC: Pharmacology, MS	Pharmacology	261001
PHD-PHAC: Pharmacology, PhD	Pharmacology	261001

PHD-PHAC-A: Pharmacology, PhD—Advanced Entry	Pharmacology	261001
PHARMD-G: Pharmacy, PharmD	Pharmacy	512001
PHARMD-G-DE: Pharmacy, PharmD—Direct Entry	Pharmacy	512001
PHARMD-U: Pharmacy, PharmD	Pharmacy	512001
BS-PHST: Pharmacy Studies, BS	Pharmacy Studies	512001
BA-PHIL: Philosophy, BA	Philosophy	380101
BS-PHIL: Philosophy, BS	Philosophy	380101
DPT-PHTH-DE: Physical Therapy, DPT—Postbaccalaureate Entry	Physical Therapy	512308
MS-PHAS: Physician Assistant, MS	Physician Assistant	510912
BS-PHYS: Physics, BS	Physics	400801
MS-PHYS: Physics, MS	Physics	400801
PHD-PHYS: Physics, PhD	Physics	400801
PHD-PHYS-A: Physics, PhD—Advanced Entry	Physics	400801
BS-PHMu: Physics and Music with Concentration in Music Technology, BS	Physics/Music	400801
BS-PHPH: Physics and Philosophy, BS	Physics/Philosophy	400801
BA-POLI: Political Science, BA	Political Science	451001
BS-POLI: Political Science, BS	Political Science	451001
MA-POLI: Political Science, MA	Political Science	451001
PHD-POLI: Political Science, PhD	Political Science	451001
PHD-POLI-A: Political Science, PhD—Advanced Entry	Political Science	451001
BS-POBA: Political Science and Business Administration, BS	Political Science/Business Adm	451001
BA-POCM: Political Science and Communication Studies, BA	Political Science/Comm Studies	451001
BS-POCM: Political Science and Communication Studies, BS	Political Science/Comm Studies	451001
BA-POEC: Political Science and Economics, BA	Political Science/Economics	451001
BS-POEC: Political Science and Economics, BS	Political Science/Economics	450603
BA-POHS: Political Science and Human Services, BA	Political Science/HumanService	451001
BS-POHS: Political Science and Human Services, BS	Political Science/HumanService	451001
BA-POIA: Political Science and International Affairs, BA	Political Science/Intl Affairs	451001
BA-POPL: Political Science and Philosophy, BA	Political Science/Philosophy	451001
BS-POPL: Political Science and Philosophy, BS	Political Science/Philosophy	451001
BS-PPBA: Politics, Philosophy, and Economics and Business Administration, BS	Politics, Phil Econ/Bus Adm	451099
BS-PSPE: Politics, Philosophy, and Economics, BS	Politics, Philosophy, and Econ	451099
MS-POHE: Population Health, MS	Population Health	512299
PHD-POHE: Population Health, PhD	Population Health	512299
PHD-POHE-A: Population Health, PhD—Advanced Entry	Population Health	512299
CERTG-PSTE: Postsecondary Teaching, Graduate Certificate	Postsecondary Teaching	131214
CERTG-PLJ: Poverty Law and Economic Justice, Graduate Certificate	Poverty Law Economic Justice	220299
P-CERTU-PMED: Premedical Studies, Postbaccalaureate Undergraduate Certificate	Pre-Medical Studies	511102
CERTG-PCFN: Primary Care Nursing FNP, Graduate Certificate	Primary Care Nursing FNP	513805

P-CERTU-PRMA: Principles of Manufacturing, Undergraduate Certificate	Principles of Manufacturing	150613
CERTG-PRVL: Privacy Law, Graduate Certificate	Privacy Law	220299
CERTG-PSEN: Process Safety Engineering, Graduate Certificate	Process Safety Engineering	140799
CERTG-PRSC: Process Science, Graduate Certificate	Process Science	261201
MS-PRDV: Product Development, MS	Product Development	142701
CERTG-PDMG: Product Management, Graduate Certificate	Product Management	111005
MSAMBA-PRAC: Accounting and Business Administration, MSAMBA	Professional Accounting	520301
P-CERTG-PSAD: Professional Sports Administration, Graduate Certificate	Professional Sports Admin	310504
DPS-PRST: Professional Studies, DPS	Professional Studies	459999
P-CERTG-PBUA: Project Business Analysis, Graduate Certificate	Project Business Analysis	521302
CERTG-PMGT-O: Project Management, Graduate Certificate—Online	Project Management	521301
P-BS-PMGT: Project Management, BS	Project Management	521301
P-CERTG-PMGT: Project Management, Graduate Certificate	Project Management	521301
P-CERTU-PMGT: Project Management, Undergraduate Certificate	Project Management	521301
P-MS-PMGT: Project Management, MS	Project Management	521301
BS-PSYC: Psychology, BS	Psychology	422799
MS-PSYC: Psychology, MS	Psychology	422799
P-BS-PSYC: Psychology, BS	Psychology	422799
PHD-PSYC: Psychology, PhD	Psychology	422799
PHD-PSYC-A: Psychology, PhD—Advanced Entry	Psychology	422799
BS-PSDE: Psychology and Design, BS	Psychology/Design	422799
BS-PSMU: Psychology and Music, BS	Psychology/Music	422799
BS-PSTH: Psychology and Theatre, BS	Psychology/Theatre	422799
MPA-PUAD: Public Administration, MPA	Public Administration	440401
P-CERTG-PUMR: Public and Media Relations, Graduate Certificate	Public and Media Relations	090102
BA-PUHE: Public Health, BA	Public Health	512201
MPH-PUHE: Public Health, MPH	Public Health	512201
MPH-PUHE-EX: Public Health, MPH—Accelerated	Public Health	512201
BA-PHLW: Public Health and Law, BA	Public Health and Law	440503
BA-PHCM: Public Health and Communication Studies, BA	Public Health/Comm Studies	512201
BA-PHCA: Public Health and Cultural Anthropology, BA	Public Health/Cultural Anthro	512201
BA-PHJO: Public Health and Journalism, BA	Public Health/Journalism	512201
BA-PHSO: Public Health and Sociology, BA	Public Health/Sociology	512201
CERTG-PUHI: Public History, Graduate Certificate	Public History	540105
MPP-PUPL: Public Policy, MPP	Public Policy	440401
PHD-PUPL: Public Policy, PhD	Public Policy	440401
PHD-PUPL-A: Public Policy, PhD—Advanced Entry	Public Policy	440401
CERTG-PUPA: Public Policy Analysis, Graduate Certificate	Public Policy Analysis	440501
BA-PUBR: Public Relations, BA	Public Relations	090902
P-CERTG-QASC: Quality Assurance Compliance, Graduate Certificate	Quality Assurance Compliance	510720
MSF-QFIN: Quantitative Finance, MSF	Quantitative Finance	270305

P-MS-REAF: Regulatory Affairs, MS	Regulatory Affairs	512009
BA-REST: Religious Studies, BA	Religious Studies	380201
BA-RSAS: Religious Studies and Africana Studies, Religious Studies/Africana St. BA		380201
P-CERTG-RESE: Remote Sensing, Graduate Certificate	Remote Sensing	450799
CERTG-ERES: Renewable Energy, Graduate Certificate	Renewable Energy	142701
CERTG-RESS: Resilience Studies, Graduate Certificate	Resilience Studies	459999
MS-RESS: Resilience Studies, MS	Resilience Studies	459999
MS-ROBO: Robotics, MS	Robotics	144201
CAGS-SCPS: School Psychology, CAGS	School Psychology	422805
PHD-SCPS-BSE: School Psychology, PhD	School Psychology	422805
PHD-SCPS-MSE: School Psychology, PhD— Advanced Entry	School Psychology	422805
P-MAT-SCED: Secondary Education, MAT	Secondary Education	131205
P-MA-SCIS: Security and Intelligence Studies, MA	Security and Intelligence Stud	430399
MS-SCEN: Semiconductor Engineering, MS	Semiconductor Engineering	151601
MA-SSED: Single Subject Education, MA	Single Subject Education	131205
P-CERTG-SMOP: Social Media for Organizational Performance, Graduate Certificate	Social Media for Org Perform	090101
BA-SOCI: Sociology, BA	Sociology	451101
BS-SOCI: Sociology, BS	Sociology	451101
MA-SOCI: Sociology, MA	Sociology	451101
PHD-SOCI: Sociology, PhD	Sociology	451101
PHD-SOCI-A: Sociology, PhD—Advanced Entry	Sociology	451101
BA-SOCA: Sociology and Cultural Anthropology, BA	Sociology/Cultural Anthropol	451101
BS-SOCA: Sociology and Cultural Anthropology, BS	Sociology/Cultural Anthropol	451101
BA-SOES: Sociology and Environmental Studies, BA	Sociology/Envr. Studies	451101
BA-SOIA: Sociology and International Affairs, BA	Sociology/Intl Affairs	451101
BA-SOPH: Sociology and Philosophy, BA	Sociology/Philosophy	451101
BA-SOPO: Sociology and Political Science, BA	Sociology/Political Science	459999
BA-SORL: Sociology and Religious Studies, BA	Sociology/Religious Studies	451101
CERTG-SWES: Software Engineering Systems, Graduate Certificate	Software Engineering Systems	140903
MS-SWES: Software Engineering Systems, MS	Software Engineering Systems	140903
BA-SPAN: Spanish, BA	Spanish	160905
BA-SPIA: Spanish and International Affairs, BA	Spanish/International Affairs	160905
BA-SPLI: Spanish and Linguistics, BA	Spanish/Linguistics	160905
BA-SPPH: Spanish and Public Health, BA	Spanish/Public Health	160905
BS-SLPA: Speech-Language Pathology and Audiology, BS	Speech-Lang Pathol/Audiology	510204
MS-SLPT: Speech-Language Pathology, MS	Speech-Language Pathology	510204
MS-SLPT-C: Speech-Language Pathology, MS— Connect	Speech-Language Pathology	510204
BS-SLBN: Speech-Language Pathology and Audiology and Behavioral Neuroscience, BS	Speech-Lng Pth Aud/Behav Neuro	510204
BS-SLHS: Speech-Language Pathology and Audiology and Human Services, BS	Speech-Lng Pth Aud/Human Serv	510204
P-MSLD-SPLE: Sports Leadership, MSLD	Sports Leadership	310504
MS-STAT: Statistics, MS	Statistics	270501
MS-STAT-C: Statistics, MS—Connect	Statistics	270501

BFA-STAR: Studio Art, BFA	Studio Art	500702
CERTG-SCM: Supply Chain Engineering Management, Graduate Certificate	Supply Chain Engineering Mgmt	140101
CERTG-SUPC: Supply Chain Management, Graduate Certificate	Supply Chain Management	520203
CERTG-SUCP: Sustainability and Climate Change Policy, Graduate Certificate	Sustain Climate Chnge Policy	440501
CERTG-SUBE: Sustainability and Business, Graduate Certificate	Sustainability and Business	520704
MS-SUEL: Sustainability Engineering Leadership, MS	Sustainability Engineer Ldrshp	149999
CERTG-STEN: Sustainability Engineering, Graduate Certificate	Sustainability Engineering	144801
CERTG-SUSC: Sustainability Sciences, Graduate Certificate	Sustainability Sciences	030104
MSSBS-SUBS: Sustainable Building Systems, MSSBS	Sustainable Building Systems	149999
CERTG-SESY: Sustainable Energy Systems, Graduate Certificate	Sustainable Energy Systems	142701
CERTG-TELD: Technology Leadership, Graduate Certificate	Technology Leadership	520216
MS-TNET: Telecommunication Networks, MS	Telecommunication Networks	110901
BA-THEA: Theatre, BA	Theatre	500501
BS-THEA: Theatre, BS	Theatre	500501
BA-THJO: Theatre and Journalism, BA	Theatre/Journalism	500501
CERTG-USLW: United States Law, Graduate Certificate	United States Law	220203
CERTG-URBA: Urban Analytics, Graduate Certificate	Urban Analytics	451201
MS-URBI: Urban Informatics, MS	Urban Informatics	111099
MS-URPP: Urban Planning and Policy, MS	Urban Planning and Policy	451201
CERTG-URBN: Urban Studies, Graduate Certificate	Urban Studies	451201
P-CERTG-USAB: Usability, Graduate Certificate	Usability	111004
CERTG-VCDV: Vaccine Development, Graduate Certificate	Vaccine Development	512006
MS-WNEN: Wireless and Network Engineering, MS	Wireless Network Engineering	141004
CERTG-WOST: Women's, Gender, and Sexuality Studies, Graduate Certificate	Women's Gender Sexuality Stu	050207
CERTG-WGSL: Women, Gender, Sexuality, and the Law, Graduate Certificate	Women, Gender, Sexuality Law	220299

Resources

The following resources supplement this catalog:

- Academic Calendars (<https://registrar.northeastern.edu/group/calendar/>)
- Class Schedules (https://service.northeastern.edu/registrar/?id=kb_article_view&sysparm_article=KB000019896&sys_kb_id=8cad210687d906d0878b0edc0ebb3502&spa=1)
- University Events (<http://calendar.northeastern.edu/>)

Information for Entering Students

Graduate education at Northeastern University integrates the highest level of scholarship across disciplinary boundaries with significant research and experiential learning opportunities in Boston and around the world. Northeastern offers hundreds of graduate programs, ranging from doctoral and full-time master's programs to part-time programs and graduate certificates, including an array of innovative PhD and master's programs designed to prepare students for emerging new fields. Students are able to take courses on campus, online, or in hybrid formats. This multidimensional learning environment offers students the knowledge and experience to excel and the flexibility to create the educational experience that best meets their needs. Our graduates are well positioned to meet the diverse demands of careers in academia, industry, and the professions.

- Academic Resources (p. 58)
- Campus Resources (p. 61)
- Information for International Students (p. 67)
- Information Technology Services (p. 68)
- Off Campus Engagement and Support (p. 69)
- Office of the University Registrar (p. 60)

Academic Resources

- Libraries (p. 59)
- Office of the University Registrar (p. 60)

Libraries

Northeastern University Library

Website (<https://library.northeastern.edu>)
617.373.8778

The Northeastern University Library serves the entire Northeastern community—in Boston, Oakland, across the global university system, and online. The Library provides collections and services supporting research and teaching across disciplines. Its collections are extensive, with a large proportion available digitally. The Library's collections include nearly 1.5 million e-books; almost 500,000 print titles; more than 180,000 licensed e-journals; and more than 270,000 streaming audio and visual titles. Access to print and electronic materials is provided through Scholar OneSearch, the Library's discovery platform. The Library's Archives and Special Collections hold historical records and publications of Northeastern and unique materials preserving the history of Boston's social movements, public infrastructure, neighborhoods, and natural environments.

Services provided by the Library include both on-site (in Boston and in Oakland) and online research help, the latter including 24/7 live chat with a reference librarian; subject-specialist librarians who provide in-depth consultation and research support for each academic program at the university; and an interlibrary loan system for providing materials not readily available at Northeastern. The Library actively supports the unique needs of graduate students in research and publishing through services such as citation management workshops, research data support, and digital scholarship services.

The Snell Library building in Boston is open to all Northeastern students, faculty, and staff. Spaces in the building include areas for group work and quiet individual study, with more than 50 group study rooms with whiteboards and plug-in displays for collaborative group work. Individual study rooms are also available for graduate students. The Library supports a range of creative activities and includes studios for audio recording and video production.

F. W. Olin Library in Oakland is open to all Northeastern students, faculty, and staff, as well as Mills College and Northeastern University alumni and community members. The Library offers a collection of 200,000 volumes and other media supporting the curricular needs of the programs on the Oakland campus. Spaces in the building include areas for quiet study and group work, including reservable study rooms, a seminar room, and the student lounge. F. W. Olin Library houses special collections in the Elinor Raas Heller Rare Book Room. Oakland special collections include early printed books, contemporary fine press and artists' books, the Mills College Archive, and other archives and manuscripts.

School of Law Library

Website (<https://law.northeastern.edu/library/>)
617.373.3332

The School of Law Library, located on four floors in the Knowles Law Center, includes a comprehensive collection of U.S. legal materials in print and in electronic format. Of particular note is the library's collection in the areas of public interest law; international human rights law; and public health, death penalty issues, and progressive lawyering. More information can be found at the School of Law Library webpage (<https://law.northeastern.edu/library/>).

Office of the University Registrar

The Office of the University Registrar provides an important link between the university's academic programs and policies and the student. It administers a number of specific services, including class scheduling, registration, record functions, verification of enrollment, reporting, and transcript services.

The Office of the University Registrar utilizes the Student Hub (<https://me.northeastern.edu/>) to provide students convenient access to information and services, including class schedules and registration, most recent grades, unofficial transcripts, and transcript and enrollment verification requests.

Office of the University Registrar website (<https://registrar.northeastern.edu/>)

registrar@northeastern.edu

617.373.2300

617.373.5351 (fax)

Maintenance of Student Records

The Office of the University Registrar is responsible for ensuring appropriate maintenance and safekeeping of student records. The transcript, which is stored electronically and maintained indefinitely, is the holistic record of student attendance and degree progress. In the event that the university discontinues operations, the archive of student records would be maintained by:

Massachusetts Department of Higher Education

One Ashburton Place

Room 1401

Boston, MA 02108

Campus Resources

- Center for Advancing Teaching and Learning Through Research (p. 61)
- Disability Access Services (p. 61)
- Employer Engagement and Career Design (p. 62)
- Public Safety (p. 63)
- University Health and Counseling Services (p. 65)
- We Care (p. 66)

Center for Advancing Teaching and Learning Through Research

catlr@northeastern.edu

Website (<https://learning.northeastern.edu/>)

617.373.3157

617.373.7779 (fax)

The Center for Advancing Teaching and Learning Through Research provides professional development for all graduate students at Northeastern University in their roles as teaching assistants, instructors, and future faculty and professionals. We provide a range of opportunities for graduate students to develop effective teaching skills, including course design and communication. CATLR is committed to supporting your success at Northeastern and beyond, and we welcome you to:

- Participate in workshops and other events to learn about effective practices in teaching and course design and to adapt them for your own current or future use.
- Meet one-on-one with a CATLR consultant to discuss any aspect of teaching or preparing for the academic job market and postdoctoral careers, including developing course syllabi, teaching statements, teaching portfolios, and diversity statements.
- Invite a CATLR consultant to observe your class, recitation, lab, studio, or guest lecture and to meet with you afterward to share and discuss their observations in relation to your own goals and reflections.

All of CATLR's services are provided on a formative and confidential basis.

Disability Access Services

617.373.2675

617.373.7800 (fax)

Website (<https://disabilityaccessservices.northeastern.edu/>)

Northeastern University and Disability Access Services (DAS) are committed to providing disability services that enable students who qualify under applicable laws such as Section 504 of the Rehabilitation Act and the Americans with Disabilities Act (ADA) Amendments Act to participate fully in the activities of the university. To receive accommodations through DAS, students must provide appropriate documentation that demonstrates a current significant limitation and the corresponding need for accommodations or services. DAS evaluates the information provided by students and their clinicians on a case-by-case basis and makes an individualized determination about requested accommodations based on an informed and interactive process. Accommodations and services are available for students with the following diagnoses, among others:

- Learning disabilities and/or ADHD
- Autism spectrum disorders
- Chronic or degenerative disorders
- Hearing loss
- Mobility impairments
- Psychiatric disorders
- Traumatic or acquired brain injury
- Vision impairments

Students should provide documentation to DAS at their earliest convenience to allow for sufficient time for review. After the documentation has been reviewed, a disability specialist will contact the student regarding appropriate next steps. Visit the DAS website (<http://www.northeastern.edu/drc/>) for additional information or contact staff at 617.373.2675.

Employer Engagement and Career Design

Website (<https://careers.northeastern.edu/>)

103 Stearns Center

617.373.2430

huskycareers@northeastern.edu (huskycareers@northeastern.edu)

Employer Engagement and Career Design serves a diverse and sustainable global network of learners, alumni, and employers, forming a powerful ecosystem that nurtures lifelong career design and partnerships by enabling learners to:

- Choose a major and explore career options that fit an individual's unique attributes
- Take advantage of experiential learning opportunities
- Make career decisions that will engage students and alumni in productive and fulfilling work
- Prepare for and conduct successful job searches
- Create meaningful and effective engagement with employers
- Contribute to meeting global and societal needs

We collaborate closely with the co-op community in all colleges and campuses across the global university while offering a dynamic framework of career design as lifelong learning with distinctive advising and programs to support learners at all stages of their journey. We are committed to supporting all learners and employer partners in eliminating biases and inequitable systems that stand in the way of achieving their goals and fostering an inclusive and just society.

Public Safety

Northeastern University Police Department

100 Columbus Place (Boston Administrative Offices)
617.373.3333 (EMERGENCY—police, fire, medical)
617.373.3934 (TTY emergency or nonemergency)
617.373.2121 (nonemergency regular business)
Emergency or Nonemergency for the Deaf and Hearing Impaired: Dial 711

Website (<https://nupd.northeastern.edu/>)

Public Safety Division Administrative Offices
617.373.2696

Personal Safety
617.373.2121

The Public Safety Division is committed to working with Northeastern University faculty, students, staff, and neighbors to build relationships and keep our campus thriving. Our work extends far beyond Boston, as we support learners in their academic and experiential endeavors around the world. The Public Safety Division is comprised of three sections: Police Department, Emergency Management, and International Safety.

The Northeastern University Police Department (<https://nupd.northeastern.edu/>) is a full-service and accredited police agency that comprises patrol and investigative divisions providing 24-hour service. NUPD has developed robust crime-detection and prevention strategies centered on technology and campus community engagement. Our well-trained officers are ready and willing to assist all members of our community.

A personal safety escort (<https://nupd.northeastern.edu/our-services/safety-escort-services/>) can be provided from one Boston on-campus location to another, any time of day, whenever personal safety is a concern. You'll need to provide your name, Northeastern ID number, and location. Safety escorts usually arrive in 10 to 15 minutes. A special, nighttime off-campus escort service, called the RedEye, runs from dusk to dawn to transport students to their residence within two miles from the center of the Boston campus. Every night from 5 p.m. until 6 a.m., the RedEye van will pick students up at Egan Access Road, behind Snell Library. In order to use this escort, you must book a ride in advance using the RedEye app, or you can book a ride at the RedEye dispatch center located at the Northeast Security office in the Ruggles Substation.

SafeZone (<https://nupd.northeastern.edu/safezone/>) is a mobile safety app that is unique to Northeastern. SafeZone is a smartphone app that any student or staff member can download and use for free. This app will connect you directly to the NUPD should you need our assistance or emergency support while you are on campus.

Fire egress drills in residence halls are held each semester to familiarize students with the alarm system and the evacuation routes. All building occupants must participate when a drill is held. For tips on fire safety, pick up a fire safety brochure or visit the NUPD website.

NUPD encourages you to familiarize yourself with all of the services provided by NUPD and to utilize the services and safety-related tips provided. If you see something that does not look or feel right, NUPD encourages you to say something by contacting NUPD at 617.373.2121 or Oakland Department of Public Safety at 510.430.3333 or utilizing the SafeZone app.

LOST AND FOUND ([HTTPS://NUPD.NORTHEASTERN.EDU/OUR-SERVICES/LOST-AND-FOUND/](https://nupd.northeastern.edu/our-services/lost-and-found/))

If you have lost an item on the Boston campus, call 617.373.3913. If your item has been turned in, we will contact you by telephone or email. If you have found an item of value on campus, return it to our headquarters located at 100 Columbus Place. If you suspect the item has been stolen, call the NUPD at 617.373.2121 to report the theft.

UNIVERSITY EMERGENCY INFORMATION ([HTTPS://WWW.NORTHEASTERN.EDU/EMERGENCY-INFORMATION/](https://www.northeastern.edu/emergency-information/))

617.373.2000 (snow emergencies)
617.373.3333 (police, medical, or fire emergencies)

Northeastern is committed to providing members of its community with a safe and secure place in which to live, work, and study.

The university is prepared to respond to emergencies and urgent situations that require immediate action. A trained team of police officers, EMTs, health and counseling experts, student affairs and residential life staff, and other professionals form a coordinated group that is able to manage a wide range of potential situations.

NU Alert, emergency broadcast communication messages, are sent to the email addresses and telephone numbers students, faculty, and staff have provided the university. For more information on NU Alert and Emergency Planning, visit the NUPD website (<https://nupd.northeastern.edu/safety/emergency-planning/>).

Oakland Department of Public Safety Information

Website (<https://oakland.northeastern.edu/student-resources/campus-safety/>)

Department of Public Safety, OAKLAND CPM, Room 113
Oaklandsafety@northeastern.edu

Campus Emergency
510.430.3333

Safety and Transportation
510.430.5555

Health and Counseling

24-Hour Mental Health Support

Mental health support is available at any time from any location through Find@Northeastern for all full-time degree-seeking students. Call 877.233.9477 (U.S.), 855.229.8797 (Canada), or +1.781.457.7777 (International) to connect with a mental health clinician who is there to listen, guide, and help. In addition, through Find@Northeastern, students have access to unlimited free counseling sessions with therapists in their local area, connection to specialized treatment providers, and free access to Headspace and SilverCloud. Learn more here (<https://uhcs.northeastern.edu/find-at-northeastern/>).

BOSTON

University Health and Counseling Services (<https://uhcs.northeastern.edu/>)

70 Forsyth Building, Suite 135, Boston MA 02115

617.373.2772

uhcs@northeastern.edu

University Health and Counseling Services provides medical and mental healthcare for students in Massachusetts. UHCS clinicians are board-certified and licensed practitioners who provide confidential assessment and treatment of medical and mental health concerns, as well as referrals to specialists in the local Boston area. Visit UHCS (<https://uhcs.northeastern.edu/>) for more information including access to care, NUSHP, medical leave of absence, and timely health updates.

OAKLAND

Counseling and Psychological Services (<https://oakland.northeastern.edu/student-resources/health-and-wellness/counseling-and-psychological-services/>)

Cowell Building, Oakland, CA 94613

510.430.2111

oakland-counseling@northeastern.edu

Counseling and Psychological Services provides mental health support for students on the Oakland campus. Located in the Cowell Building, CAPS offers brief therapy, groups, outreach services, and referrals to supportive resources. Visit CAPS (<https://oakland.northeastern.edu/student-resources/health-and-wellness/counseling-and-psychological-services/>) for more information, including additional mental health resources available through Find@Northeastern.

Student Health Center (<https://oakland.northeastern.edu/student-resources/health-and-wellness/>)

CPM 117, Oakland, CA 94613

510.431.1108

The Student Health Center provides on-campus confidential healthcare to students enrolled at Mills at Northeastern University. Services offered include primary and preventive care, basic treatment for illnesses and injuries, laboratory and pharmacy services, and referrals to specialty care and imaging services. The Student Health Center is an outpatient clinic staffed by a board-certified and licensed nurse practitioner and supported by a team that includes a board-certified physician.

We Care

617.373.7591

wecare@northeastern.edu (we_care@northeastern.edu)

Website (<https://we-care.studentlife.northeastern.edu/>)

The We Care Office assists students who are experiencing unexpected challenges to maintain their academic progress. The staff works with students individually to help them understand and explore their options, which may involve explaining Northeastern University policy, providing resources and referrals, and coordinating among university offices. We Care also provides guidance to faculty and staff in identifying Northeastern resources and policies to help students succeed.

Information for International Students

Office of Global Services

Website (<https://international.northeastern.edu/ogs/>)
617.373.2310

The Office of Global Services provides immigration advice and support services to over 20,000 international students and scholars enrolled throughout our global university system.

OGS enhances the educational experience of international students and scholars at Northeastern University by cultivating a supportive and inclusive community that fosters academic success and promotes personal growth. Through personalized comprehensive advising and dynamic programming, we empower students and scholars with understanding the regulatory complexities of maintaining their student/scholar status and connect them to resources to successfully navigate, adapt to, and excel in their new academic and cultural environments.

OGS provides stability in an ever-evolving regulatory climate, and we work collaboratively with campus partners toward positive outcomes for students and scholars within this framework. OGS advocates for international student and scholar interests and needs, not only within the larger university community but also at the local, regional, and national levels throughout our campus network.

OGS provides **immigration advising services** to assist international students in understanding the benefits and restrictions of being an international student, as governed by the federal immigration regulations set forth by the country of the student's study location within the Northeastern global university system. OGS advises students on the complexities of immigration compliance and interfaces with various government agencies. OGS is also responsible for monitoring student academic progress and maintaining institutional compliance through mandatory governmental reporting.

During **international student orientation**, international students will receive an overview of the immigration compliance requirements along with information and resources to support academic success, student life, campus safety, and cultural adjustment. OGS serves as a home away from home for all international students and offers a wide array of **programs and services** to assist international students with their cultural adjustment, academic success, and professional growth.

During every required academic term, international students must maintain **full-time status and appropriate on-ground presence** at Northeastern to comply with federal immigration regulations. Timely registration for full-time, on-ground courses is especially important so that international students may remain in compliance with Northeastern's governmental reporting requirements. For study permit holders in Canada, full-time registration is required to maintain work and postgraduation benefits. For F-1/J-1 students in the United States, full-time status and appropriate on-ground presence is required to maintain eligibility for all associated benefits of F-1/J-1 status. For those on student visas in the United Kingdom, students must adhere to the conditions of their student visa and fully comply with Northeastern's Academic Engagement Monitoring Policy.

Because understanding federal regulations is complex and often nuanced, international students should consult with OGS if they have questions about their individual status.

OGS—UNITED STATES ([HTTPS://INTERNATIONAL.NORTHEASTERN.EDU/OGS/](https://international.northeastern.edu/ogs/))

Information for international students and scholars attending Northeastern in the United States including I-20 (F-1) or DS-2019 (J-1) issuance, visa processing, general guidelines for maintaining status, postgraduation benefits, orientation, events and programs, and support services. F-1 and J-1 students are encouraged to regularly review the guidelines on maintaining status (<https://international.northeastern.edu/ogs/current-students/understanding-visa-requirements/guidelines-on-maintaining-status/>).

OGS—CANADA ([HTTPS://INTERNATIONAL.NORTHEASTERN.EDU/OGS/STUDENT-SUPPORT/GLOBAL-CAMPUSES/CANADA/](https://international.northeastern.edu/ogs/student-support/global-campuses/canada/))

Information for international students attending the Northeastern program in Canada including study permit compliance and extension, work eligibility, co-op work permit application, Post-Graduation Work Permit application, general guidelines, and support services.

OGS—UNITED KINGDOM ([HTTPS://WWW.NULONDON.AC.UK/ADMISSIONS/VISAS/](https://www.nulondon.ac.uk/admissions/visas/))

Information for international students attending the Northeastern program in the United Kingdom including information about Certificate of Acceptance for Studies issuance, UK student visa application processes, enrollment requirements, attendance guidelines, work regulations, poststudy work programs, and other important information regarding study requirements.

Information Technology Services

IT Services is Northeastern University's central group that provides technology services, solutions, and support to all Northeastern students. Visit the **Connect To Tech guide** (<https://connect-to-tech.northeastern.edu/students/>) for information and key technology resources that are particularly helpful to students, including:

- Northeastern accounts
- Access to email
- Laptop recommendations and discounts
- Canvas learning management system
- Software such as Office 365 and Adobe Creative Cloud
- Frequently used websites and mobile apps

Technology Support and IT Service Desk

Technology support is available 24/7 online or by phone and email. Walk-up support is available at the Tech Bar on the Boston and Oakland campuses.

G (https://service.northeastern.edu/tech/?id=its_contact_us) **et IT Support >**

service.northeastern.edu/tech (<https://service.northeastern.edu/tech/>)

617.373.HELP [4357]

help@northeastern.edu

Visit the **Tech Service Portal** (<https://service.northeastern.edu/tech/>) to search for how-tos and FAQs, borrow a laptop or other equipment, start a live chat, and search other resources.

Occasionally, interruptions to university systems, services, and tools can happen—when they do, get updates about them through Northeastern's **IT status page** (<https://northeastern.statuspage.io/>).

Off Campus Engagement and Support

617.373.8480

offcampus@northeastern.edu

Off Campus Engagement and Support and our Network Housing team at Northeastern University provide support and education related to off-campus housing, renters' rights information, and campus and community connection. We offer many resources, special programs, and events to help you find off-campus housing in Boston and across the Northeastern network; connect with roommates; stay involved on campus; and serve as a link to your peers, alumni, and community. For students on co-op, our Network Housing support offers leased housing options in popular co-op locations.

We also help you understand your rights and responsibilities as a renter, understand your lease, and how to navigate landlord issues. Peer Community Ambassadors plan programs and events for you, are here to answer all of your questions, and help you meet your neighbors.

Our extensive website offers a host of resources including an apartment search database (<http://aptsearch.northeastern.edu/>); information on neighborhoods and transportation; as well as Northeastern, City of Boston, and Network Housing resources and relocation services.

Off Campus Engagement and Support publishes an e-newsletter that provides valuable tips and information on upcoming programs and events both on campus and off campus. Individuals interested in receiving our newsletter can sign up here (<http://offcampus.sites.northeastern.edu/newsletter/>) or email us at offcampus@northeastern.edu.

For more information, visit Off Campus Engagement and Support (<http://offcampus.sites.northeastern.edu/>).

Financial Information

Student Financial Services is available to assist you in developing a plan for financing a Northeastern University education. To learn more, visit the Student Financial Services website (<https://studentfinance.northeastern.edu/>).

- Contact Student Financial Services (SFS) (p. 71)
- Tuition and Fees (p. 72)
- Billing and Tuition Adjustments (p. 79)
- Payment (p. 82)
- Financial Aid (p. 83)
- Northeastern University Student Health Plan (NUSHP) (p. 86)

Contact Student Financial Services (SFS)

Contacting Student Financial Services

Student Financial Services assists students, families, and supports through a range of self-service tools, in-person assistance, and remote services. Connect with our team to access the resources and guidance needed to navigate the financial aspects of your education with confidence.

SELF-SERVICE RESOURCES

Many SFS needs can be addressed through our convenient self-service tools, available 24/7 to our global community.

SFS SERVICE PORTAL

Students and families can find answers to common questions and access a wide range of services through the SFS Service Portal. This portal offers a comprehensive FAQ knowledge base and convenient online forms to help manage needs related to financial aid and student accounts. Services include:

- Requesting a loan adjustment or cancellation
- Reducing or canceling federal work-study funds
- Reporting an outside scholarship
- Submitting outside form requests
- And much more

Students are encouraged to log in utilizing assigned Northeastern University credentials to receive faster service.

Visit the SFS Service Portal to get started quickly and easily.

Other Contact Methods

For more ways to connect with SFS, including phone, fax, walk-in availability, and office hours, please visit the Contact Us page on the Northeastern website.

SFS INQUIRY FORM

If you need additional support beyond our self-service options, the Student Financial Services Inquiry form is the most efficient way to contact our team. Once your form is submitted, a case number will be assigned to your inquiry. This case number allows you to:

- Track the progress of your request
- Reference your inquiry in follow-up communications
- Ensure faster, more accurate assistance from our staff

Please provide as much detail as possible when submitting your form to help us resolve your issue efficiently.

NUSHP SUPPORT

For inquiries related to the Northeastern University Student Health Plan, please contact NUSHP directly. The NUSHP team is best equipped to assist with all health-plan-related questions.

Tuition and Fees

For students interested in pursuing financial assistance or educational loans, additional educational costs, known as Cost of Attendance (COA) components, can be included in the calculation of aid and loan eligibility. Components may include food, housing, books, course materials, supplies, equipment, transportation, personal expenses, and the cost of obtaining a first professional licensure. You can find comprehensive details on Student Financial Service's website (<https://studentfinance.northeastern.edu/billing-payments/tuition-and-fees/>). Please keep in mind that COA can vary significantly depending on academic program, enrollment intensity, and individual circumstances.

Please note that courses taken outside of the student's home college may be billed at the per-credit rate of the college offering the course.

U.S. and Online Programs University Interdisciplinary Programs

Graduate Program	Cost per Credit Hour
MS Artificial Intelligence	
College Delivering Course:	
College of Engineering	\$1,929 USD
Khoury College of Computer Sciences	\$1,875 USD
MS Complex Network Analysis	
College Delivering Course:	
Bouvé College of Health Sciences	\$1,946 USD
College of Science	\$1,928 USD
College of Social Sciences and Humanities	\$1,446 USD
Khoury College of Computer Sciences	\$1,875 USD
MS Data Science and MS Data Science—Align	
College Delivering Course:	
College of Engineering	\$1,929 USD
Khoury College of Computer Sciences	\$1,875 USD
MS Extended Realities	
College Delivering Course:	
Bouvé College of Health Sciences	\$1,946 USD
College of Arts, Media and Design	\$2,059 USD
College of Engineering	\$1,929 USD
College of Social Sciences and Humanities	\$1,446 USD
D'Amore-McKim School of Business	\$1,884 USD
Khoury College of Computer Sciences	\$1,875 USD
MS Robotics	
College Delivering Course:	
Bouvé College of Health Sciences	\$1,946 USD
College of Engineering	\$1,929 USD
Khoury College of Computer Sciences	\$1,875 USD
MS Statistics and MS Statistics—Connect	
College Delivering Course:	
Bouvé College of Health Sciences	\$1,946 USD
College of Science	\$1,928 USD
Khoury College of Computer Sciences	\$1,875 USD
Graduate Certificate, AI Applications (on ground)	\$656 USD
Graduate Certificate, AI Applications (online)	\$328 USD
Graduate Certificate, Product Management	\$1,012 USD

College of Arts, Media and Design

Graduate Program	Cost per Credit Hour
All graduate programs, except specific programs listed below.	\$2,059 USD
Music Lab Fee	\$821 USD (per semester/course)

D'Amore-McKim School of Business

Graduate Program	Cost per Credit Hour
All graduate programs, except specific programs listed below. Please also see the second table below for fees billed in addition to tuition for some programs.	\$1,884 USD
MBA Business Administration—Online	\$900 USD
MS Business Analytics (online)	\$750 USD
MS Management (online)	\$800 USD
MS Management with Concentration in Digital Transformation in Healthcare (online)	\$830 USD
MS Management with Concentration in Healthcare Administration (online)	\$830 USD
MSAMBA Accounting and Business Administration	\$77,475 USD (program rate)
Graduate Certificate, Business Administration (online)	\$438 USD

Item	Fee
All campus-based, full-time graduate programs, except specific programs listed below.	\$1,600 USD billed in year 1 in two installments (\$800 each), fall and spring terms
MBA Business Administration—Full-Time	\$3,100 USD billed in year 1 in two installments (\$1,550 each), fall and spring terms
Global Consulting Course (applies only to students in the MBA Business Administration—Full-Time program)	\$750 USD (for the course, in addition to program fee)
Global Field Study Course	\$1,500 USD (for the course)
MSFMBA Finance and Business Administration	\$3,100 USD billed in year 1 in two installments (\$1,550 each), fall and spring terms
MSFMBA Quantitative Finance and Business Administration	\$3,100 USD billed in year 1 in two installments (\$1,550 each), fall and spring terms
JD Law / MBA Business Administration—Full-Time	\$3,100 USD billed in year 1 in two installments (\$1,550 each), fall and spring terms
LLM Law / MBA Business Administration—Full-Time	\$3,100 USD billed in year 1 in two installments (\$1,550 each), fall and spring terms
MS Management with Concentration in Strategic Technology Leadership (hybrid only)	\$3,000 USD billed in year 1 in two installments (\$1,500 each), fall and spring terms
MSA Accounting	\$0

Khoury College of Computer Sciences

Graduate Program	Cost per Credit Hour
All PhD programs	\$15,750 USD (per semester)
All graduate programs, except specific programs listed below.	\$1,875 USD
All Graduate Certificates (Online)	\$1,847 USD

College of Engineering

Graduate Program	Cost per Credit Hour
All PhD programs	\$15,750 USD (per semester)
All other graduate programs, except specific programs listed below.	\$1,929 USD
MS Data Analytics Engineering—Online	\$750 USD
MSEM Engineering Management (online)	\$750 USD
MSIS Information Systems (online)	\$750 USD
Graduate Certificate, Data Analytics Engineering—Online	\$328 USD

Bouvé College of Health Sciences

Graduate Program	Cost per Credit Hour
All PhD programs	\$15,750 USD (per semester)
All other graduate programs, except specific programs listed below.	\$1,946 USD
DMSc Healthcare Leadership	\$1,071 USD
DPT Physical Therapy—Postbaccalaureate Entry	\$21,528 USD (per semester)
PharmD Pharmacy—Direct Entry	\$1,946 USD
PharmD Pharmacy—Direct Entry, Clinical	\$16,492 USD (per semester)
PharmD Pharmacy, Sixth Year (Early Assurance Entry)	\$16,492 USD (per semester)
CAGS Nursing—Adult-Gerontology Nurse Practitioner, Primary Care	\$1,035 USD
CAGS Nursing—Neonatal Nurse Practitioner	\$1,035 USD
CAGS Nursing—Psychiatric-Mental Health	\$1,035 USD
MPH Public Health (Charlotte)	\$1,226 USD
MS Applied Behavior Analysis	\$1,439 USD
MS Applied Psychology (online)	\$1,035 USD
MS Exercise Science	\$1,320 USD
MS Health Data Analytics—Online	\$750 USD
MS Health Informatics	\$1,501 USD
MS Nursing—Direct Entry	\$23,298 USD (per semester)
MS Nursing (online)	\$1,035 USD
MS Nursing Leadership	\$1,035 USD
MS Physician Assistant	\$20,488 USD (per semester)
Graduate Certificate, Applied Psychology in Context (online)	\$437.50 USD
Graduate Certificate, Extreme Medicine	\$1,071 USD
Graduate Certificate, Health Informatics Management and Exchange	\$1,501 USD
Graduate Certificate, Primary Care Nursing FNP	\$1,035 USD

School of Law

Graduate Program	Cost per Credit Hour
All programs, except specific programs listed below.	\$65,652 USD (per academic year)
JD Law, Part-Time Option (FlexJD)	\$49,230 USD (per academic year)
LLM Law (On Ground)	\$65,652 USD (per academic year)
LLM Law—Online	\$1,575 USD
MLS Legal Studies—Online	\$1,219 USD
For MS Media Advocacy (interdisciplinary program), see College of Arts, Media and Design above.	
Graduate Certificates	\$1,219 USD

College of Professional Studies

Graduate Program	Cost per Credit Hour
All graduate programs, except specific programs listed below.	\$919 USD
DLP Law and Policy (self-paced, 69 QH program; new students as of 7/1/20)	\$1,144 USD
Executive DLP Law and Policy (students entering prior to 7/1/19)	\$2,397 USD
Executive DLP Law and Policy (69 QH program; new students as of 7/1/20)	\$1,663 USD
EdD Education	\$1,090 USD
CAGS Education Leadership Management	\$1,090 USD
MAT Teaching	\$755 USD
MEd Education	\$755 USD
MEd Higher Education Administration	\$831 USD

MPS Analytics	\$1,207 USD (students entering after 7/1/22)
MPS Applied Machine Intelligence	\$1,207 USD (students entering after 7/1/22)
MPS Digital Media	\$1,172 USD (students entering after 7/1/22)
MPS Informatics	\$1,172 USD (students entering after 7/1/22)
MS Commerce and Economic Development	\$1,207 USD (students entering after 7/1/22)
MS Global Studies and International Relations	\$945 USD
MS Project Management	\$972 USD (students entering after 7/1/22)
MS Regulatory Affairs	\$945 USD
MSTC Technical Communication	\$945 USD
Master's-level graduate courses for personal and professional enrichment (nondegree)	\$919 USD
Graduate Certificate, 3D Animation	\$1,172 USD (students entering after 7/1/22)
Graduate Certificate, Agile Project Management	\$972 USD (students entering after 7/1/22)
Graduate Certificate, Biopharmaceutical Regulatory Affairs	\$945 USD
Graduate Certificate, Cloud Computing Application and Management	\$1,172 USD (students entering after 7/1/22)
Graduate Certificate, Digital Media Management	\$1,172 USD (students entering after 7/1/22)
Graduate Certificate, Digital Video	\$1,172 USD (students entering after 7/1/22)
Graduate Certificate, Experiential Teaching and Learning	\$755 USD
Graduate Certificate, Game Design	\$1,172 USD (students entering after 7/1/22)
Graduate Certificate, Global Studies and International Relations	\$945 USD
Graduate Certificate, Higher Education Administration	\$831 USD
Graduate Certificate, Human-Centered Informatics	\$1,172 USD (students entering after 7/1/22)
Graduate Certificate, International Biopharmaceutical Affairs	\$945 USD
Graduate Certificate, Leading and Managing Technical Projects	\$972 USD (students entering after 7/1/22)
Graduate Certificate, Medical Device Regulatory Affairs	\$945 USD
Graduate Certificate, Nonclinical Biomedical Product Regulation	\$945 USD
Graduate Certificate, Project Business Analysis	\$972 USD (students entering after 7/1/22)
Graduate Certificate, Project Management	\$972 USD (students entering after 7/1/22)
Graduate Certificate, Quality Assurance Compliance	\$945 USD

College of Science

Graduate Program	Cost per Credit Hour
All PhD programs	\$15,750 USD (per semester)
All other graduate programs, except specific programs listed below.	\$1,928 USD
MS Bioinformatics	\$1,938 USD
MS Biotechnology	\$1,938 USD
MS Environmental Science and Policy	\$1,894 USD
MS Marine Biology	\$1,660 USD
Graduate Certificate, Bioinformatics	\$1,938 USD
Graduate Certificate, Biotechnology	\$1,938 USD
Scuba Fee	\$52 USD (per semester/course)

College of Social Sciences and Humanities

Graduate Program	Cost per Credit Hour
All PhD programs	\$15,750 USD (per semester)
All other graduate programs, except specific programs listed below.	\$1,446 USD
MA English	\$1,393 USD
MA History	\$1,393 USD
MPA Public Administration	\$1,056 USD
MPP Public Policy	\$1,013 USD
MS Criminology and Criminal Justice	\$1,083 USD

MS Economics	\$1,589 USD
MS Resilience Studies	\$1,013 USD

Mills College at Northeastern University

Graduate Program	Cost per Credit Hour
All graduate programs	\$794 USD

Office of the Provost

Graduate Program	Cost per Credit Hour
All graduate programs, except specific programs listed below.	\$1,864 USD
All PhD programs	\$15,750 USD (per semester)
Doctor of Professional Studies	\$1,555 USD
Graduate Certificate, Organizational Communication—Online	\$438 USD
Graduate Certificate, Project Management—Online	\$438 USD

Dissertation and Continuation

Item	Fee
Master's or professional doctorate continuation fee (flat rate)	Equivalent to the college per-credit-hour rate listed above

Fees

For a complete list of fee descriptions, please visit Student Financial Services (<https://studentfinance.northeastern.edu/billing-payments/tuition-and-fees/fee-descriptions/>).

Item	Fee
Northeastern University Student Health Plan (p. 86)	\$2,849 USD (assessed annually)
International Student Fee	\$450 USD (onetime fee)

Campus-Specific Fees

Boston	
• Student Center Fee, full-time students (Boston students, except College of Professional Studies and School of Law students)	\$85 USD (per term)
• Student Center Fee, part-time students (Boston students, except College of Professional Studies and School of Law students)	\$12 USD (per term)
• Student Center Fee, College of Professional Studies students (Boston students)	\$9 USD (per quarter)
• Student Recreation Fee (full-time Boston students)	\$75 USD (per term)
• Student Recreation Fee (part-time Boston students)	\$40 USD (per term)
• Student Recreation Fee, College of Professional Studies (Boston students)	\$30 USD (per quarter)
• Student Activities Fee (Boston students)	\$19 USD (per term)
• Health and Counseling Fee (Boston students)	\$225 USD (assessed annually)
• Parking (per semester, optional)	
Oakland	
• Student Activities (ASMC) Fee (Oakland students)	\$100 USD (per term)
• AC Transit Fee (Oakland students)	\$72 USD (per term)

- Campus Comprehensive Fee (Oakland students) \$700 USD (per term)

California Residency-Based Fee

- Student Tuition Recovery Fund (STRF) Fee¹ Assessed annually

¹ The state of California mandates an STRF fee, at a rate of \$2.50 per \$1,000 of institutional charges, to students who are California residents or are enrolled in a residency program.

Canadian Programs

College of Arts, Media and Design

Graduate Program	Cost per Credit Hour
MS Information Design and Data Visualization (domestic students)	\$1,071 CAD
MS Information Design and Data Visualization (international students)	\$1,500 CAD

Khoury College of Computer Sciences

Graduate Program	Cost per Credit Hour
All graduate programs (domestic students)	\$1,243 CAD
All graduate programs (international students)	\$1,618 CAD

College of Engineering

Graduate Program	Cost per Credit Hour
All graduate programs (domestic students)	\$1,158 CAD
All graduate programs (international students)	\$1,503 CAD

Bouvé College of Health Sciences

Graduate Program	Cost per Credit Hour
MS Health Informatics (domestic students)	\$1,243 CAD
MS Health Informatics (international students)	n/a

College of Professional Studies

Graduate Program	Cost per Credit Hour
MS Project Management (domestic students)	\$875 CAD
MS Project Management (international students)	\$1,013 CAD (students entering prior to 7/1/2023)
	\$1,053 CAD (students entering as of 7/1/2023)
MPS Analytics (domestic students)	\$987 CAD
MPS Analytics (international students)	\$1,165 CAD
MPS Informatics (domestic students)	\$959 CAD
MPS Informatics (international students)	\$1,116 CAD
MPS Digital Media (domestic students)	\$959 CAD
MPS Digital Media (international students)	\$1,116 CAD
MPS Digital Media—Connect (domestic students)	\$959 CAD
MPS Digital Media—Connect (international students)	\$1,116 CAD
MS Regulatory Affairs (domestic students)	\$899 CAD
MS Regulatory Affairs (international students)	\$1,045 CAD

College of Science

Graduate Program	Cost per Credit Hour
MS Bioinformatics (domestic students)	\$1,249 CAD
MS Bioinformatics (international students)	\$1,687 CAD
MS Biotechnology (domestic students)	\$905 CAD
MS Biotechnology (international students)	\$1,387 CAD

Billing and Tuition Adjustments

Our team is committed to helping students and families understand the student account and associated billing statements, important dates and deadlines, payment options, and overall financial responsibilities associated with a Northeastern University education.

Billing Policy

Tuition bills are only generated electronically each semester and are available via the Student Hub. Paper bills are not generated. Balances are due prior to the start of the term. For additional information regarding the e-bill, please visit the Billing & Payments Frequently Asked Questions webpage.

Students must authorize parent or guardian access to view billing information and make payment via the Family Portal. For more information, visit the Northeastern Accounts website.

Discrepancies in your bill should be addressed in writing via the Student Financial Services Inquiry form. Include your name, Northeastern ID, Northeastern email address, dollar amount in question, date of invoice, and any other relevant information.

Responses will be sent to the student's Northeastern email address. If there is a discrepancy in your bill, pay the undisputed part of the bill to avoid responsibility for any late fees or financial holds.

Student Financial Responsibility Agreement

As compelled by federal law, all students who enroll in classes at Northeastern are required to complete and accept the Student Financial Responsibility Agreement, which acknowledges their obligations and understanding of the financial policies of the university. This will be available for completion after July 1 each academic year. The SFRA informs students of the financial responsibilities associated with enrolling for classes and explains the potential consequences that may result if a student fails to meet those obligations. This agreement must be completed once per academic year and is located on the Student Hub. Failure to complete the SFRA will result in a hold that prevents registration.

Past-Due and Delinquent Balances

When a student fails to make payment on a balance owed, the university may initiate a series of progressively severe actions, including but not limited to:

- Assessment of late fees
- Placement of a financial hold preventing:
 - Course registration or schedule changes
 - Participation in global study programs
 - Release of diplomas
- Initiation of collections activity, including referral to third-party collection agencies
- Collection fees
- Involuntary withdrawal from the university

Students withdrawn for nonpayment remain financially liable for all outstanding tuition and fees. In addition, the student is responsible for all reasonable collection costs and any legal fees incurred by the university during the collection process.

INTERNATIONAL STUDENTS

For students in F-1 or J-1 visa status, failure to resolve delinquent balances in a timely manner may negatively impact immigration status, potentially affecting eligibility to remain in or reenter the United States. Students who face status issues due to failure to resolve delinquent balances should contact the Office of Global Services.

Late Fee Policy

Northeastern has implemented a policy regarding late fees. If the balance on a student's account remains unpaid, 30 days after the initial bill due date the university will impose a late fee of \$150 on the student's account. If the student's account balance remains unpaid after the initial late fee is assessed, the university will impose an additional 1% late charge once a month, until the balance is paid. If delinquency continues to a subsequent term, the late fee assessment cycle will start again. There will be an initial late fee, in the amount of \$150, then an additional 1% late charge once a month until the balance is paid.

If a student or payer wishes to dispute a late fee assessment, they may review and submit the Late Fee Removal Request form.

Collection Partners

As outlined in the SFRA, student account balances that remain unpaid will be placed initially with ECSI, Northeastern's precollections partner. If a student account balance remains unpaid, the past-due student account balance will then be placed with a collections agency (Reliant or Radius). Information about Northeastern's collections partners can be found [here](#).

Tuition Adjustments for Dropping a Course

If a student drops one or more courses, they are eligible for a full reversal of the course tuition as long as the course(s) were dropped before the course drop deadline. Once the deadline to drop a course without a W grade passes, the student is responsible for 100% of tuition and associated charges —no partial refunds will be provided. Refer to the academic calendar for course registration dates. Please see the Financial Aid page (p. 83) for information on how financial aid will be impacted for withdrawing from or dropping a course.

Credit balances will be refunded to the student unless otherwise directed by the student or the bill payer. Note the following exceptions:

- Payment plans and supplemental loans: Credit balances created from supplemental loans or overpayment to the monthly payment plan will be refunded to the bill payer on record unless a completed Refund Authorization form, stating that funds may be released directly to the student, is received from that borrower. Please note that anticipated credits are funds that have not been received by the university and, therefore, cannot be refunded.
- International payments: Credit balances created from an international payment must be returned to the originating bank by the payment method used.

Tuition Adjustments for Official University Withdrawal

If a student submits an official withdrawal from the university, they may be eligible for a tuition adjustment based on the official withdrawal date recorded. Note that nonattendance does not constitute official withdrawal.

Tuition adjustments vary according to the duration of the course.

Please also see the Financial Aid page (p. 83) for information on how aid is impacted by withdrawal.

Information on the university's Emergency Leave of Absence policy is located in the Graduate Catalog (p. 58) (p. 58) in the "Academic Policies and Procedures" section.

Refund Schedule - Semester Calendar Programs

	Full Term	Half Term	Thirds	First Semester JD Students
Before Term	100%	100%	100%	80%
Week 1	100%	100%	0%	60%
Week 2	100%	0%	0%	40%
Week 3	0%	0%	0%	20%
Week 4	0%	0%	0%	0%

Refund Schedule - Quarter Calendar Programs

Before Term	100%
12-week quarters:	
Week 1	100%
Week 2	100%
Week 3 and thereafter	0%
6- and 8-week quarters:	
Week 1	100%
Week 2	100%
Week 3 and thereafter	0%
4-week quarters:	
Week 1	100%
Week 2 and thereafter	0%
1-week or less quarters:	

Week 1	100% (first day only)
Week 2 and thereafter	0%

STATE-SPECIFIC POLICIES

To comply with local laws regarding student refunds, Northeastern maintains state-specific refund policies. Additional information is available on the Student Financial Services website.

Tuition Insurance

Given the substantial financial commitment that students and their families must make to pay for a Northeastern education, Student Financial Services offers options for tuition insurance. For more information, visit the Student Financial Services website.

Tax Information

Northeastern provides certain annual tax forms to eligible students. For more information, visit the Student Financial Services website.

Payment

Northeastern University is committed to assisting students in developing a plan for financing their Northeastern education. Through a variety of options—including federal financial aid, Northeastern's monthly payment plan, supplemental loans, and your own resources—a plan can be designed that will make your education costs affordable.

Student Financial Responsibility Agreement

As compelled by federal law, all students who enroll in classes at Northeastern are required to complete and accept the Student Financial Responsibility Agreement, which acknowledges their obligations and understanding of the financial policies of the university. This will be available for completion after July 1 each academic year. The SFRA informs students of the financial responsibilities associated with enrolling for classes and explains the potential consequences that may result if a student fails to meet those obligations. This agreement must be completed once per academic year and is located on the Student Hub. Failure to complete the SFRA will result in a hold that prevents registration.

Payment Options

Northeastern accepts multiple payment methods. Payments will be accepted for billed charges only. Northeastern is not able to process payments for more than the balance due on the student's account.

Accepted methods of payment include:

- Electronic check and credit card
- International payments via payment partners
- 529 payments
- Other payment options including external scholarships, tuition paid by employers or other third parties, tuition reimbursement, and tuition insurance

For additional information regarding payment options, visit the Student Financial Services website.

For information on payment timelines, late payments, and adjustments to tuition, please see the graduate Billing and Tuition Adjustments page. (p. 79)

Financing Options

NORTHEASTERN'S MONTHLY PAYMENT PLAN

Northeastern offers a monthly payment plan, which allows students and families to divide their educational costs each semester into smaller, more manageable installments. In using this plan, it can reduce your need to borrow, thereby reducing the overall cost of education. The monthly payment plan can be combined with awarded financial aid as well as other payment and financing options. Multiple people can set up payment plans for the same student.

STUDENT LOANS

There are a number of educational loan programs available to assist eligible students and families in covering expenses over and above any financial aid that may be awarded from Student Financial Services. Most private lenders have credit and income requirements that students and/or parents must meet before being approved for these programs. When researching the loan and lender that best meet your needs, make sure you take into consideration the interest rate; the quality of customer service; as well as any origination, disbursement, and/or repayment fees.

Account Credit Balance Refunds

The university automatically issues refunds for eligible students whose account reflects a credit balance.

If a credit card has been used to pay any portion of the amount due, the refund will be made first to that credit card. If the credit balance on the account exceeds the amount that was paid via credit card, these additional funds will be refunded by check or direct deposit.

For additional information regarding student refunds, including Frequently Asked Questions, visit the Student Financial Services website.

Financial Aid

Northeastern University is committed to helping students make their higher education goals a reality. Our team provides the resources, support, and expert guidance needed to navigate the financial aid application process, stay on top of key dates and deadlines, and understand the factors that influence aid eligibility.

Financial Aid Eligibility

Students in the graduate colleges must meet all criteria to be eligible for federal financial aid including:

- Be a U.S. citizen or eligible noncitizen
- Be matriculated in a degree-granting program
- Have received a high school diploma or GED
- Not be in default from previous student loans
- Maintain satisfactory academic progress

Additionally, to be eligible for federal financial aid you must be enrolled in at least 4 credits per term, unless you are on a co-op, clinical rotation, residency, or are enrolled in a full-time or part-time stand-alone course.

Students enrolled in graduate certificate programs are not eligible for federal financial aid.

While international students are not eligible for federal aid, other financing options are available. Please visit the Student Financial Services website to learn more about the resources available to international students.

Types of Aid for Graduate Students

GRADUATE ASSISTANTSHIPS AND SCHOLARSHIPS

Graduate assistantships and awards are offered directly by the individual graduate schools or academic departments. Students seeking such assistance should contact their graduate school for eligibility criteria.

To review a description of available scholarships, visit the Student Financial Services website.

LOAN PROGRAMS

There are a number of different loan programs available to help graduate students finance their education. These programs include the following:

- Federal Direct Graduate PLUS Loan
- Health Professions Student Loans and Nursing Student Loans
- Physician Assistant Loan
- Supplemental Student Loans

For more information, please visit the Student Financial Services website .

How to Apply

To apply for financial aid, first-year and transfer students must submit the Free Application for Federal Student Aid. Returning students must submit the FAFSA each academic year.

Students are encouraged to submit their financial aid application materials by the priority filing deadline date to ensure that they are considered for all available financial aid programs for which they qualify. To view the priority filing deadline dates and learn more about the financial aid application process, visit the Student Financial Services website.

The timeline for receiving an award after applying for aid can vary, and students may need to respond to additional document requests. For more information on awarding timelines, see the Student Financial Services website.

Typical Graduate Financial Aid Award

Eligible students who file the FAFSA will be automatically considered for the Federal Direct Unsubsidized Loan, provided that all eligibility requirements have been met. The maximum amount that a student may borrow per academic year in the Federal Direct Unsubsidized Loan program is \$20,500.

For more information about the Federal Direct Loan Program, visit the Student Financial Services website.

Satisfactory Academic Progress

QUALITATIVE

Student grade-point averages are reviewed annually at the end of spring semester. Satisfactory academic progress requires a cumulative quality point average of 3.000 or better. The qualitative standard will be reviewed annually. Students that fail to meet this standard will not be eligible for federal aid until the cumulative 3.000 QPA is achieved.

QUANTITATIVE

Students must also meet certain quantitative requirements. Completed credits are reviewed as a percentage of attempted credits after each academic year. Students must earn at least 50% of their cumulative attempted credits to maintain SAP.

Additionally, graduate students must complete their program within the maximum allowable time frame and will not be eligible to receive financial aid once they have attempted more than 200% of the normal credits required for their degree or certificate program. Day students should refer to their college or program for the number of credits required for their degree.

APPEALS

Students who have lost their eligibility for financial aid due to failure to meet qualitative or quantitative SAP standards have the right to appeal for an additional probationary term of financial aid.

For additional information regarding SAP and the appeals process, visit the Student Financial Services website.

Change in Enrollment Status

Students must notify Student Financial Services about any change in planned period of enrollment, whether due to withdrawal from a class, a leave of absence, a change in co-op or academic division, or withdrawal from the university. Students should be aware that any change in enrollment status may result in a change in federal or institutional aid eligibility. It is the student's responsibility to notify Student Financial Services about any change in enrollment status and to ensure understanding of the ramifications of such changes. It is highly recommended that whenever possible, students discuss the impact of such changes with their financial aid counselor before making them.

For more information on how students are billed for classes taken during co-op or less than full-time enrollment, please see Graduate Billing and Tuition Adjustments.

Outside Sources of Aid

Students must notify Student Financial Services of any external aid received, such as scholarships from outside organizations. This will prompt a review, and financial aid may be recalculated based on federal, state, and institutional requirements. For further information on reporting outside aid, please visit the Student Financial Services website.

Return of Title IV Aid

Northeastern is required by federal statute to recalculate federal financial aid eligibility for students who withdraw, drop out, are dismissed, or take a leave of absence prior to completing 60% of a term. Recalculation is based on the percentage of earned aid using the Federal Return of Title IV funds formula. Federal regulations require students to obtain at least an A, B, C, D, S, or F in at least one course for the term; students who receive all unsuccessful grades for a term (NE, #W, #I, #U) will be considered unofficially withdrawn from the term. For unofficial withdrawals, the withdrawal date used for aid recalculation is the midpoint of the term.

For information on how tuition may be adjusted for withdrawals, please see Graduate Billing and Tuition Adjustments. (p. 79)

Verification

If a student is selected for verification, Student Financial Services may be required to collect additional financial documents, including tax returns and other financial documents, to verify the information provided on the FAFSA. In some cases, verification may result in changes to financial aid. For incoming students, verification must be completed before aid can disburse. For returning students, verification must be completed before aid can be awarded and disbursed.

For more information on this process, visit the Student Financial Services website.

Appeals

In some instances, graduate students may have educational expenses that exceed the standard budget for their program and may choose to utilize additional loans. Allowable expenses that may serve as the basis for a budget increase appeal may include living expenses that exceed the standard budget, dependent care, disability-related expenses, and others. For more information, students can review the Student Financial Services website.

VA Education Benefits

In accordance with Title 38 USC 3679 (e), covered individuals utilizing Chapter 31 or Chapter 33 education benefits at Northeastern University will not have any penalty imposed on their account nor will they be required to take out additional funding due to pending or late payments from the Department of Veterans Affairs as long as the Dolce Center for the Advancement of Veterans and Servicemembers has a current Certificate of Eligibility or VRE Authorization on file AND a Request for VA Benefit Certification is submitted through the Student Hub (<https://me.northeastern.edu>) portal.

COEs must be submitted before the start of the student's first term but do not need to be resubmitted unless entitlement information changes. Students are also required to complete the Request for VA Benefit Certification form through the Student Hub (<https://me.northeastern.edu>) portal before the start of each term they wish to use VA benefits. Students may have a hold placed on the account if there is an outstanding balance after payment from the VA is received by Northeastern.

Northeastern University Student Health Plan (NUSHP)

General Information

Since September 1989, Massachusetts law (M.G.L. c. 15A, § 18) has required every full-time and part-time student enrolled in a certificate, diploma, or degree-granting program in a Massachusetts institution of higher learning to participate in a Student Health Plan or in a health benefit plan with comparable coverage.

The Northeastern University Student Health Plan defines a full-time student as having full-time student status and enrolled in any amount of credits of a full-time curriculum.

NUSHP defines a part-time student as having part-time student status and enrolled in at least 75% of credits of the full-time curriculum (College of Professional Studies undergraduate students—9 credits, CPS graduate students—6 credits).

The health fee is assessed each term on a student's account based on these definitions unless the student has previously waived the health plan fee in the current academic year. Once enrolled, the student will remain enrolled for the entire plan year, ending August 31.

Students on co-op or on study abroad are considered active students and will be enrolled in and billed for NUSHP each year.

Students enrolled in pre-matriculation and online programs are not eligible for NUSHP.

Health Insurance Waiver

Eligible students are automatically enrolled in NUSHP each academic year and may waive NUSHP via the Waiver Portal (<https://go.gallagherstudent.com/Universities/Northeastern%20University/Home/>) after they have been billed for NUSHP. In addition, to be eligible to waive, comparable coverage must be effective from the beginning of the term the student meets Student Health Program requirements.

Students with comparable, ACA-compliant, domestic health coverage, may choose to waive NUSHP by completing the waiver request. A waiver request will be evaluated to ensure compliance. An email will be sent to the student if the waiver is approved, denied, or needs additional information to be completed. If a waiver is requested and approved, the student will be accepting responsibility for all medical expenses incurred, and neither Northeastern nor its Student Health Plan will be responsible for these expenses.

Visit the NUSHP website (<https://studenthealthplan.northeastern.edu/>) for more waiver information and deadlines.

Academic Policies and Procedures

Universitywide Academic Policies and Procedures

- Academic Integrity Policy (p. 88)
- Academic Consequences for Violating the University Academic Integrity Policy (p. 91)
- Accommodations for Students with Disabilities (p. 92)
- Attendance Requirements (p. 93)
- Campus Transfer and Campus Location Change (p. 94)
- Clearing an Academic Deficiency (p. 95)
- Code of Student Conduct (p. 96)
- Course Credit Guidelines (p. 112)
- Course Numbering System (p. 113)
- Course Substitutions (p. 114)
- Course Withdrawal (p. 114)
- Grade Change Policy (p. 114)
- Grade Table and GPA (p. 115)
- Graduation Requirements (p. 117)
- Instructional Methods (p. 119)
- Leaves of Absence and University Withdrawal (p. 120)
- Personal Information (p. 123)
- Requesting and Clearing An Incomplete Grade (p. 123)
- Retaking Courses (p. 123)
- Student Bill of Academic Rights and Responsibilities (p. 124)
- Student Records Privacy (p. 127)
- Student Responsibility Statement (p. 129)
- Student Right-to-Know Act (p. 129)
- Student Time Status (p. 130)
- University-Sponsored Travel (p. 132)

Graduate Academic Policies and Procedures

- Academic Appeals Policies and Procedures (p. 133)
- Academic Calendars (p. 136)
- Audit Policy (p. 136)
- Cooperative Education (p. 137)
- Course Credit Sharing (p. 139)
- Departmental Jurisdiction (p. 140)
- Dropping a Class (p. 140)
- Final Examinations and Related Policies on Other Exams (p. 140)
- Minimum Cumulative GPA (p. 141)
- Overload Conditions for Graduate Assistants (p. 141)
- Satisfactory/Unsatisfactory Grading (p. 141)
- Student Complaints (p. 142)

GRADUATE PROGRAM REGULATIONS AND REQUIREMENTS

- All Graduate Degree Programs (p. 143)
- Certificates of Advanced Graduate Study (p. 150)
- Doctor of Philosophy (PhD) Programs (p. 151)
- Graduate Certificate Programs (p. 145)
- Interdisciplinary Graduate Degrees (p. 153)
- Master's Degrees (p. 146)
- PlusOne Degree Combinations (p. 147)
- Professional Doctorate Degree Programs (p. 148)
- Definitions (p. 154)

Academic Integrity Policy

A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship fosters an environment where students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire university.

As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. Northeastern expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this policy or by the direction of instructors.

The following is a broad overview, but not an all-encompassing definition, of what constitutes a violation of academic integrity.

Cheating

The university defines cheating as using or attempting to use unauthorized materials, information, or study aids in any academic exercise. When completing any academic assignment, a student shall rely on their own mastery of the subject.

Examples include, but are not limited to:

- Unauthorized use of aids such as, but not limited to, notes, text, the internet, artificial intelligence, chatbots, cellphones, etc., to complete any academic assignment
- Copying from another student's current or past academic work
- Unauthorized communication during an examination
- Handing in the same academic material, in part or in total, for more than one course without explicit permission from the instructor(s)
- Intentionally viewing a test before it is administered
- Storing notes on paper or in a portable electronic device for use during an examination

Fabrication

The university defines fabrication as falsification, misrepresentation, or invention of any information, data, or citation in an academic exercise.

Examples include, but are not limited to:

- Inventing data, facts, or sources for an academic assignment
- Altering the results of a lab experiment or survey
- Citing a source in a bibliography that was not used
- Stating an opinion as a scientifically proven fact

Plagiarism

The university defines plagiarism as using as one's own the words, ideas, data, code, or other original academic material of another without providing proper citation or attribution. Plagiarism can apply to any assignment, either final or drafted copies, and it can occur either accidentally or deliberately. Claiming that one has "forgotten" to document ideas or material taken from another source does not exempt one from plagiarizing.

The following sources require citation:

- Word-for-word quotations from a source, including another student's work
- Paraphrasing (using the ideas of others in your own words)
- Unusual or controversial facts not widely recognized
- Audio, video, digital, or live exchanges of ideas, dialogue, or information
- Charts, diagrams, graphics, and images
- Recycling or reusing one's own specific words from previously published texts.

Students unclear as to whether or not a source requires citation should speak with their professor or consult the Writing Center (<https://cssh.northeastern.edu/writingcenter/>).

Unauthorized Collaboration

The university defines unauthorized collaboration as instances when students submit individual academic works that are substantially similar to one another. While several students may have the same source material, any analysis, interpretation, or reporting of data required by an assignment must be each individual's independent work unless the instructor has explicitly granted permission for group work.

Examples include, but are not limited to:

- Submitting work that closely matches that of another student, even when the work is to be original to the student handing in the assignment
- Sharing a take-home examination, case write-up, lab report, or any other assignment with a peer or on any nonpersonal portfolio website such as, but not exclusive to, Chegg, Course Hero, Quizlet, etc., without express permission from the instructor

Participation in Academically Dishonest Activities

The university defines participation in academically dishonest activities as any action taken by a student with the intention of gaining an unfair advantage over other students.

Examples include, but are not limited to:

- Misrepresenting oneself or one's circumstances to an instructor
- Stealing an examination
- Purchasing a prewritten paper
- Selling, loaning, or otherwise distributing materials intended for the purpose of cheating, plagiarism, or other academically dishonest acts
- Destroying, altering, stealing, or forging another student's work, library materials, laboratory materials, academic records, course syllabi, or examination/course grades
- Intentionally missing an examination or assignment deadline to gain an unfair advantage
- Forging information or signatures on official university documents such as, but not limited to, attendance logs, resumés, cover letters, honesty statements, etc.

Facilitating Academic Dishonesty

The university defines facilitating academic dishonesty as intentionally or knowingly helping or contributing to the violation of any provision of this policy.

Examples include, but are not limited to:

- Doing academic work for another student
- Making available previously used academic work for another individual who intends to resubmit the work for credit

Obligation to Uphold Academic Integrity

All members of the Northeastern community have a role in upholding the Academic Integrity Policy. Any member of the community who witnesses a violation of this policy should report it to the appropriate faculty member or the Office of Student Conduct and Conflict Resolution (<https://osccr.sites.northeastern.edu/>). All instructors are required to refer to Northeastern's Academic Integrity Policy in their course syllabi.

Options for Instructors Reporting Alleged Violations of the Academic Integrity Policy

A faculty member who suspects a student in their class, or working under their direction, of violating the Academic Integrity Policy can choose to:

- File official charges with the OSCCR
- Submit the complaint as an "information only" case to request that the incident be kept "on file" for the student

The director of OSCCR will review all complaints submitted against a student to determine whether sufficient evidence for a violation of the Academic Integrity Policy exists. If the director determines that the evidence of a potential violation is sufficient, the case will be assigned to a staff member within OSCCR. An instructor who believes that a student made an unintentional mistake should note that belief in an Academic Integrity report. The director of OSCCR, or designee, will review the report along with supplemental documents provided and any prior student conduct history to determine if an administrative hearing is necessary or if an "Information Only" educational reminder notice is appropriate to increase learning and awareness of campus resources. The faculty member is advised to speak with any student they intend to report for an alleged violation of the Code of Student Conduct.

Sanctions

Hearing officers and the Student Conduct Board have discretion to impose sanctions for a responsible finding of an Academic Integrity violation that range in severity from a written warning to expulsion and include an action taken by the student to help rebuild trust within the community.

Hearing officers will take the following into consideration when determining appropriate sanctions for violations of the Academic Integrity Policy:

- Nature of the violation(s)
- Severity of the damage, injury, or harm resulting therefrom
- Student's past student conduct record
- Mitigating circumstances
- Aggravating circumstances

Appeals

Students may appeal the disciplinary actions of an Academic Integrity violation on the three grounds identified in the Code of Student Conduct. The appeals process outlined in the Code of Student Conduct (p. 96) will be used for such appeals. Please refer to the Code of Student Conduct (p. 96) for a complete description and explanation of the appeals process.

Grading Authority

OSCCR does not have authority over assignment or course grades. Therefore, a student who violates Northeastern's Academic Integrity Policy may also be subject to academic penalties (<https://catalog.northeastern.edu/undergraduate/academic-policies-procedures/academic-consequences-violating-academic-integrity-policy/>) at the discretion of the instructor in the course. This can result in, but is not restricted to, the student failing the course. A student with questions about the academic appeals process should contact the academic advisor to review that process.

Academic Consequences for Violating the University Academic Integrity Policy

The purpose of the Code of Student Conduct (p. 96) is to set forth Northeastern University's expectations of behavior that promote the safety and welfare of the Northeastern community. The Code of Student Conduct gives an overview of what constitutes a violation of academic integrity. Violations of the Code are handled and/or overseen by the Office of Student Conduct and Conflict Resolution (<https://osccr.sites.northeastern.edu/>).

Hearing officers and the Student Conduct Board have discretion to impose sanctions for a "responsible" finding of an academic integrity violation that range in severity from a written warning to expulsion and include an action taken by the student to help rebuild trust within the community. OSCCR does not have authority over assignment of course grades. Therefore, a student who violates Northeastern's Academic Integrity Policy may also be subject to academic consequences at the discretion of the instructor in the course.

When a student has been found responsible for violating the Academic Integrity Policy, faculty members have the discretion to apply an academic consequence. Academic consequences may include:

- **Resubmission:** resubmission of an assignment, or retaking an exam or quiz, without penalty
- **Single grade reduction:** reduction of grade or failure on project, exam, quiz, or other academic exercise on which the student was found responsible for violating the Academic Integrity Policy
- **Course grade reduction:** reduction of course grade or failure in the course

Consequences of violating academic integrity should be described in the course syllabus. When assigning consequences, faculty may consider:

- The student's familiarity with academic integrity expectations
- The amount of instruction the student has had on the violation
- The percentage of the assignment/assessment affected by the alleged violation
- The value of the affected assignment/assessment on the course grade
- The impact of the violation on others

Academic consequences may be applied through a process defined by the college.

Accommodations for Students with Disabilities

617.373.2675

617.373.7800 (fax)

Website (<https://disabilityaccessservices.northeastern.edu/>)

Northeastern University and Disability Access Services (DAS) are committed to providing disability services that enable students who qualify under applicable laws such as Section 504 of the Rehabilitation Act and the Americans with Disabilities Act (ADA) Amendments Act to participate fully in the activities of the university. To receive accommodations through DAS, students must provide appropriate documentation that demonstrates a current significant limitation and the corresponding need for accommodations or services. DAS evaluates the information provided by students and their clinicians on a case-by-case basis and makes an individualized determination about requested accommodations based on an informed and interactive process. Accommodations and services are available for students with the following diagnoses, among others:

- Learning disabilities and/or ADHD
- Autism spectrum disorders
- Chronic or degenerative disorders
- Hearing loss
- Mobility impairments
- Psychiatric disorders
- Traumatic or acquired brain injury
- Vision impairments

Students should provide documentation to DAS at their earliest convenience to allow for sufficient time for review. After the documentation has been reviewed, a disability specialist will contact the student regarding appropriate next steps. Visit the DAS website (<http://www.northeastern.edu/drc/>) for additional information or contact staff at 617.373.2675.

Attendance Requirements

Class participation is essential to success no matter the course format or its delivery. Individual instructors may have course-specific attendance policies. It is the student's responsibility to ascertain what each instructor requires. Failure to meet attendance requirements may force a student to drop the applicable courses. Students should not make conflicting commitments until the class schedules for each semester are final. Permission to make up work may be granted by instructors for reasonable cause. Requests must be made immediately upon a student's return to class. Laboratory work can be made up only during the hours of regularly scheduled instruction.

Absence Because of University-Sponsored Activities

Participation in university-sponsored activities, where the students are representing their university, college, or department, may cause absences from class that qualify as excused absences. Excused absences, with appropriate prior arrangement, are not subject to penalty, and missed work may be satisfied through agreement between the student and the instructor. University-sponsored activities that may justify excused absences include athletic competition, performing arts events, and research or other presentations.

Students must discuss absence(s) with instructors at least two weeks in advance of the university-sponsored activity, or as soon as possible if the activity is at the beginning of the term or is the result of an unforeseen circumstance. Instructors may require a written statement from the administrator in charge of the activity. Instructors are expected to make reasonable accommodations for these class absences, including administration of makeup assignments and exams whenever possible. It is expected that students seeking an excused absence will develop a plan and timetable to make up the missed coursework with their instructor(s). Note, however, that the requirements of some courses or programs may preclude such accommodations.

Absence Because of Religious Beliefs

Any student who is unable, because of their religious beliefs, to attend classes or to participate in any examination, study, or work requirement should be provided with an opportunity to make up such examination, study, or work requirement that they may have missed because of such absence on any particular day, provided that such makeup examination or work does not create an unreasonable burden upon the university. Students should make appropriate arrangements with the instructor in advance of the absence, preferably at least two weeks before the religious observance.

Absence Because of Jury Duty

Members of the university community are expected to fulfill their obligations to serve on a jury if called upon. A student selected for jury duty should inform their instructors. They will provide a reasonable substitute or compensatory opportunities for any required work missed. A student with such an absence will not be penalized in any way.

Absence Because of Military Deployment

See Leave of Absence Due to Military Deployment (<https://catalog.northeastern.edu/undergraduate/academic-policies-procedures/leaves-of-absence-withdrawal/#military>).

Other Absences

Unforeseen events or circumstances, including illness, may cause a student to be absent from class. Students must notify their instructors and academic advisor, as appropriate, as soon as possible to apprise them of the circumstances leading to their absence, as well as how much time will be missed. Students must work with their instructors to develop a plan, with a timetable, to make up missed coursework. Students cannot be required to provide medical documentation, including sick notes or verification of medical treatment. (Faculty and students should note that the University Health and Counseling Services does not provide sick notes or medical excuses except for long-term illness.) Instructors are expected to make reasonable accommodations for warranted class absences, including administration of makeup assignments and exams, whenever possible.

Extended Absences

A student who is absent from school for an extended period of time must inform their academic advisor by letter, email, or telephone. The expected length of the absence may determine whether the student should apply for a medical or emergency leave of absence (<https://catalog.northeastern.edu/undergraduate/academic-policies-procedures/leaves-of-absence-withdrawal/#medical>). It is strongly recommended that the student contact their academic advisor to discuss potential next steps, which could include incomplete grades; withdrawal from classes; or, in the event of an extended absence due to a chronic medical condition or disability, consultation with Disability Access Services to explore potential accommodation.

Nonattendance

Nonattendance does not constitute official course dropping or withdrawal, which means the student is fully responsible for the academic and financial consequences. Like all grades for courses attempted and/or completed, a grade earned due to nonattendance impacts a student's academic progression, an international student's visa eligibility, and a federal financial aid recipient's aid eligibility and award.

Campus Transfer and Campus Location Change

Campus Transfer

Students may request an official campus transfer from their school/college to complete their program. The program has to be approved by the school/college academically AND meet regulatory requirements (state/provincial licensure). If the student is an international student, the program has to be offered in compliance with nonimmigrant status/study permit requirements at the requested new home campus location. International students should seek advice from the Office of Global Services (<https://international.northeastern.edu/ogs/>) before the final decision to transfer to another campus.

Campus Location Change

Students may request a campus location change to a new campus (the host campus) for a period no longer than one academic year (two consecutive semesters or three consecutive quarter terms) and no more than 50% of a degree program. It must be approved by the school/college academically, and courses must be offered that allow the student to make normal academic progress in compliance with regulatory requirements. In order for international students to change a campus location, the academic program has to be offered in compliance with nonimmigrant status/study permit requirements at the requested host campus location. International students should seek advice from the OGS (<https://international.northeastern.edu/ogs/>) before requesting a campus location change.

Clearing an Academic Deficiency

An academic deficiency occurs when a student fails to complete a course with a satisfactory grade. The deficiency may occur because the student has failed the course or because the student has passed the course but with a grade that does not meet the minimum required by the student's program.

Students who have academic deficiencies may be required to clear them before progressing within the curriculum, especially if a given course is a prerequisite for future coursework. Deficiencies may affect the student's expected year of graduation.

With the approval of the appropriate program faculty and/or academic advisor, students can clear deficiencies in the following ways:

1. Retake the same course at one of Northeastern University's colleges, which will result in a "retake" grade (see "Retaking Courses" in this section of the catalog).
2. Substitute a comparable course at one of Northeastern's colleges, which will result in a "retake" grade (see "Substituting Courses" in this section of the catalog).
3. Under special circumstances, if the course is not currently offered at Northeastern, a student may be advised to take a preapproved course at another institution outside Northeastern. The original grade will remain on the student's Northeastern transcript.

Code of Student Conduct

Adopted November 12, 1971; last revised in April 2025.

The purpose of the Code of Student Conduct (the Code) is to set forth the university's expectations of behavior that promotes the safety and welfare of the Northeastern University community. The university seeks to provide a supportive environment that is conducive to learning, the pursuit of truth, the exchange of knowledge, the intellectual development of students, and the general good of society. In those instances where violations of the behavioral expectations occur, Northeastern has developed policies and procedures to protect the interests of members of the university community, individually and collectively. The Code has been developed with the assistance of students, faculty, and staff of the university.

Applicability of the Code On and Off Campus/Jurisdiction of the Code

The Code applies to all Northeastern students, at all levels of study, in all colleges and programs, at all locations in the United States or abroad, on-ground or online, as well as all student groups and organizations. It applies to all Northeastern students both on and off campus. The university establishes guidelines for the behavior of its students to promote student conduct that does not adversely affect the educational mission of the university; members of the university community; and the university's relationship with the surrounding community, partner institutions, or co-op partners. Student behavior occurring off campus that allegedly violates the Code; university policy; local, state, federal, or host country laws; and that could negatively affect the educational mission of the university or its relationship with the surrounding community may subject students to discipline as noted in the Code.

Alleged violations of the Code are handled and/or overseen by the Office of Student Conduct and Conflict Resolution (<https://osccr.sites.northeastern.edu/>). Because the conduct process is an educational process and not a legal or criminal one, the formal legal rules of evidence do not apply to the Code and its procedures. The Code states all rights applicable to the conduct process. Students may not access documents not included in their case packet, demand access to individuals, or compel witnesses to participate in the conduct process. For information regarding Title IX, sexual violence, and related rights and procedures, please refer to the university's Policy on Sexual and Gender-Based Harassment and Title IX (<https://policies.northeastern.edu/policy104/>), which governs the investigation, adjudication, appeal, and other elements of the university's response to allegations of conduct that may constitute sexual or gender-based harassment or misconduct.

The Code also applies to all accepted and prematriculated students. The university reserves the right to adjudicate an accepted student who allegedly engages in prohibited conduct prior to matriculation (e.g., at the university's New Student Orientation programs, while moving in, or prior to the official start of the semester) through the conduct process.

When a student withdraws, takes a leave of absence, or becomes inactive from the university after allegedly engaging in conduct that may violate any of the university's policies, rules, regulations, or standards of conduct, but before the alleged violation has been adjudicated through the conduct process, a hold will be placed on the student's record and the student will be banned from campus. The hold will prevent a student from reenrolling at the university until the alleged violations have been resolved. The university reserves the right to delay the awarding of a degree, certificate, badge, or other credential pending the resolution of the student conduct process. In the event a student is found responsible for violating university policy and the sanction is expulsion, the student will not be eligible to be awarded their pending credential. The university also reserves the right, in its discretion, to revoke degrees.

General Expectations

As citizens and as members of an academic community, students enjoy the same basic privileges and are bound by the same responsibilities as all citizens. Presence on campus and/or student status does not shield students from the law. Northeastern assumes that all students will abide by the policies, rules, and regulations of the university and by state, local, federal, and host country laws. The university reserves the right to inform the police or other appropriate authorities when student behavior appears to violate laws.

It is recognized that all members of an academic community, individually and collectively, have a right to express their views publicly on any issue; however, the university insists that all such expressions be peaceful and orderly, conducted in a manner consistent with the Code and university policies, and in such a way that university business and respectful academic discourse are not unduly disrupted. Northeastern students seeking to demonstrate on university property and/or in connection with a university event must comply with all applicable university policies (<https://policies.northeastern.edu/policy617/>), protocols, procedures, and requirements. Moreover, students must clearly indicate that they are speaking as individuals and not for or on behalf of the university community.

Students are expected to display proper respect for the rights and privileges of other members of the university community and their guests. The atmosphere on university property, in university facilities, online, and at university programs and events must be free from undue disruption. Furthermore, students must comply with all directions issued by university officials (including Northeastern University Police Department officers and other public safety officers acting on behalf of the university). Students are expected to be honest and forthright in their dealings with the university. Falsification, distortion, or misrepresentation of information to the university or university officials could result in being charged with a violation of the Code.

Students are expected to engage directly with OSCCR regarding any alleged violations of the Code. While students are free to consult with advocates and third parties, such third parties are not permitted to ask or communicate on behalf of students in the student conduct process. Additionally, recordings of any kind are not permitted in OSCCR, except as permitted by the Code or with express permission of OSCCR staff.

STUDENT EXPECTATIONS

Each Northeastern student can expect:

1. Written notification of alleged Code or university policy violations within a reasonable period of time from OSCCR's receipt of the complaint or incident report pertinent to those allegations. This notification will state the role of the involved student (such as charged student, victim, etc.) and date, time, and place of the administrative hearing or prehearing meeting, in the case of a Student Conduct Board (the Board) hearing. The date, place of incident, and the complainant and/or reporting party (where permitted by law and university policy) will also be included.
2. The opportunity to request to reschedule a hearing date up to one business day prior to the hearing, due to academic or other reasonable conflicts. Requests may be granted at the discretion of OSCCR.
3. The opportunity to request that a hearing be suspended after the presentation of information for a brief and agreed-upon period of time.
4. The opportunity to coordinate with Disability Access Services (<https://disabilityaccessservices.northeastern.edu/>) to request any accommodations or adjustments needed to participate in the conduct process in an equitable manner.
5. The option to request OSCCR to provide speech translation services during the hearing process.
6. The hearing may proceed without the student's presence, consistent with the Code.
7. OSCCR to make reasonable efforts to issue the decision letter within 10–15 business days after the conclusion of the hearings pertinent to the case.
8. The option to choose a Hearing Advisor, as outlined within the Structure and Procedure section of the Code, to serve as a guide throughout the student conduct hearing process.
9. The option to file an appeal within five business days. Further information regarding appeals is outlined within the Procedures for Student Appeals section of the Code.

In cases where a Board hearing is scheduled, the following procedural rights also apply:

1. To review written information received by OSCCR that is pertinent to the case (subject to any applicable privacy laws or policies), a minimum of one business day prior to the designated Board hearing date, and to address inferences that might be drawn from such statements during the Board hearing.
2. To a hearing before a panel composed of three or five Board members or, at the discretion of the director of OSCCR or designee, three members of the OSCCR staff.
3. To request the removal of names from the list of prospective Board members, with reasonable notification and explanation.
4. To question witnesses, to produce witnesses on the student's own behalf, and to present substantiating information and written personal statements on the student's own behalf. Witnesses are individuals who were present for the incident in question and/or have information relevant to the incident.

Each Northeastern student has the responsibility:

1. To review and abide by the Code and university policies and procedures, both academic and otherwise, until the conferring of their degree.
2. To monitor their university email address and respond to any Northeastern notifications sent directly to the individual student.
3. To maintain their local address information and update it at the beginning of each semester when they are an active student.
4. To represent the university appropriately, both on and off campus.
5. To respect the differences of individuals and treat others in a civil and respectful manner.
6. To carry their university ID with them at all times and present it to officials when requested.
7. To honor their fiscal responsibilities to the university.

Decision-Making Authority

1. The senior vice chancellor for student life is responsible for the overall administration of the Code, as well as the student conduct process, as it applies to individuals and student groups. Under the oversight of the senior vice chancellor for student life, the director of OSCCR has been charged with the day-to-day responsibility for administering the Code and the student conduct process.
2. All decisions made by the Board, Hearing Administrator, Appeals Board, and/or Fraternity and Sorority Life Standards Boards are subject to final approval and modification by the senior vice chancellor for student life, or designee.
3. The Board and designated Hearing Administrators are authorized to take official disciplinary actions in accordance with the policies, regulations, and sanctions contained in the Code and other policies and regulations of the university.
4. The policies and procedures outlined in the Code will at all times govern the adjudication of matters relating to the Code.

Structure and Procedure of the Student Conduct Process

The student conduct process begins when a report alleging a violation of the Code is received by OSCCR, Residential Life, Global Experience Office, or the Center for Student Involvement. For information regarding Title IX, sexual violence and misconduct, and related rights and procedures, please refer to the university's Policy on Sexual and Gender-Based Harassment and Title IX (<https://policies.northeastern.edu/policy104/>), which governs the investigation, adjudication, appeal, and other elements of conduct prohibited under that policy. Notwithstanding the procedures established in the Code, the university reserves the right to act in a manner it deems necessary or appropriate to address alleged Code violations and promote the safety and well-being of the campus community, including but not limited to altering specific elements and procedures within the Code as necessary to achieve this goal. The university specifically reserves the right to delay the awarding of a degree, certificate, badge, or other credential pending the completion of the student conduct process.

Reports of sexual and gender-based harassment and misconduct (including sexual harassment, sexual assault, domestic violence, intimate partner violence, dating violence, stalking, or retaliation) involving students are addressed by the university's Policy on Sexual and Gender-Based Harassment and Title IX (<https://policies.northeastern.edu/policy104/>) and separate procedures referenced in that policy, which outline the investigation and resolution of claims of conduct prohibited by that policy. Reports of prohibited conduct can be submitted directly to the Title IX coordinator and the Office for University Equity and Compliance (<https://ouec.northeastern.edu/>) via several reporting options (<https://ouec.northeastern.edu/reporting-options/>).

FILING A REPORT

Incident reports can be submitted by clicking on Report an Incident (<https://osccr.sites.northeastern.edu/report-an-incident/>). Any academic or administrative official, university staff member, faculty member, student, law enforcement agency, or member of the community may file a complaint involving any student or student organization. The complaint should include the following information, if available:

1. Name(s) of the student or student organization alleged to have violated the Code and/or university policy
2. Description of the incident
3. Date of the incident
4. Names and contact information of witnesses
5. Names and contact information of those filing the report

In most instances, the person who submits a report will serve as the complainant if the report results in resolution through a Board hearing.

THE ROLE OF THE OFFICE OF STUDENT CONDUCT AND CONFLICT RESOLUTION

The role of the OSCCR (<https://osccr.sites.northeastern.edu/>) is to review all reports it receives to determine if a violation of the Code allegedly occurred and to oversee or directly resolve complaints of an alleged violation. OSCCR does not represent either party. From time to time, OSCCR may conduct or participate in an investigation to gather information about the alleged violation(s).

REVIEWING THE REPORT AND DETERMINING HEARING TYPE OR OTHER ACTION

The director of OSCCR, or designee, reviews the report to determine if a violation of the Code allegedly occurred. The severity of the alleged violation is also considered, as this determines the type of hearing that generally will be used to resolve the complaint/case. In most cases, off-campus legal proceedings will not be grounds for delay. OSCCR will determine in each case the appropriate hearing type or other action appropriate to resolve charges. However, if either party has concerns about this, the party should communicate such concerns to the Hearing Administrator. OSCCR retains the right to determine when and in what format any alleged Code violations are heard through administrative hearing or Board hearing, as well as the timing of such hearing.

- Administrative hearing—When the severity of the alleged violation(s) could result in sanctions of written warning, disciplinary probation, or deferred suspension, involved students will receive a hearing notice requesting their attendance at an administrative hearing.
- Student Conduct Board—When the severity of the alleged violation(s) could result in sanctions of suspension or expulsion, or if the facts of the incident are so complex that an administrative hearing is not appropriate, involved students will receive a hearing notice requesting their attendance at a prehearing, which precedes a Board hearing.
- End-of-term hearings—Incidents that occur and/or matters that are being scheduled to be heard during the last two weeks of classes, or finals, may be resolved by one of the following end-of-term hearing processes:

Board level—Incidents that may result in suspension or expulsion, or if the facts of the incident are so complex that an administrative hearing is not appropriate, may be resolved by an administrative hearing held prior to the end of the term or a Board hearing for the following term.

Administrative level—Incidents that will not result in suspension or expulsion may be resolved by an administrative hearing held prior to the end of the term or immediately following the end of the term.

Information only—When a report is filed with the OSCCR that is deemed to not rise to the level of a Code violation but worthy of a formal conversation to discuss behavioral expectations, an Information Only meeting may occur. Involved students will meet

with a Hearing Administrator to review the report and to clarify expectations. This does not involve formal charges against the student, but OSCCR may consider the action as part of a student's history if subsequent violations occur.

Letter only—When a report is filed with the OSCCR that is deemed to not warrant an individual meeting to address concerns, a formal reminder of expectations letter may be sent to the involved parties in order to resolve the case. The letter will include an overview of the concern and written reminder of expectations. This does not involve formal charges against the student, but OSCCR may consider the action as part of a student's history if subsequent violations occur.

When distance precludes a student from having a face-to-face Board hearing or administrative hearing with a member of OSCCR, the case may be resolved via a video conference or phone hearing.

- **Alternate resolution**—The OSCCR reserves the right to determine if the incident can be resolved by alternative means (e.g., mediation). All parties involved must agree to this, as the outcome of this alternate resolution is final.

PLEASE NOTE: The university reserves the right to hear any case, even ones where the violation(s) could result in a sanction of suspension or expulsion, through an administrative hearing when it is determined to be appropriate.

Determining responsibility—In all hearings, the Hearing Administrator or Board will use the “preponderance-of-evidence” standard, also known as “more-likely-than-not” standard, to determine if a violation of the Code occurred.

PLEASE NOTE: OSCCR will take into account the severity of the incident when determining the most appropriate method of resolving end-of-term cases.

HEARING ADVISORS

Students participating in the student conduct process may choose a university faculty or staff member who has been trained by OSCCR to serve as a Hearing Advisor. No current student may serve as Hearing Advisor. Students will receive a list of members from the university community who have volunteered to serve as a Hearing Advisor and been trained in the conduct process. Visit OSCCR's website for a full list of current Hearing Advisors (<https://osccr.sites.northeastern.edu/hearing-advisors/>). Staff or faculty who represent a student as legal counsel outside the conduct process may not act as the student's Hearing Advisor in the university process, except as permitted under the university's Policy on Sexual and Gender-Based Harassment and Title IX. Students who wish to have a Hearing Advisor present with them during meetings should communicate to OSCCR availability that is inclusive of the Hearing Advisor's schedule. Appointments will not be rescheduled solely due to a Hearing Advisor's inability to attend.

PLEASE NOTE: If Hearing Advisors fail to follow the set expectations during the proceedings of a hearing, the Hearing Administrator may take action including the removal of the Hearing Advisor from the hearing or the cessation of the hearing itself.

The role of the Hearing Advisor includes:

1. Assisting the student in understanding how the hearing will proceed.
2. Assisting the student with understanding the resolution process.
3. Attending the hearing (administrative, Board, admitted responsibility) if the student prefers and selects a time within the Hearing Advisor's availability.
4. Providing emotional support before, during, and after a hearing.
5. At no time is the Hearing Advisor permitted to address the Board or Hearing Administrator directly or communicate on behalf of the student.

DESCRIPTION OF ADMINISTRATIVE HEARINGS

When the severity of the alleged violation(s) could result in sanctions of written warning, disciplinary probation, or deferred suspension, or in certain other circumstances identified in the Code, involved students will receive a hearing notice requesting their attendance at an administrative hearing.

Notification

The administrative hearing notice will be sent to students via their university email account. This notice will provide them with the date and location of the incident; the complainant and/or reporting party (where permitted by law and university policy); the alleged violation(s); and the date, time, and location of the hearing.

The Hearing

An administrative hearing is a one-on-one meeting between the student and Hearing Administrator to discuss the alleged violation(s). Third parties including but not limited to witnesses, lawyers, parents, guardians, and friends are not permitted to attend an administrative hearing. Hearing Advisors may attend at the request of the student. During the hearing, the student provides their account of the incident, the Hearing Administrator presents the student with the report and other available documentation (from which information about or identifying others may be redacted), and asks questions to clarify or identify missing information. In addition, the student can present written documentation, including witness statements, at the administrative hearing for the Hearing Administrator's review. After the presentation of information, the student may suspend the administrative hearing for a brief and agreed-upon amount of time. After the information has been gathered and the hearing concludes, the Hearing Administrator will

review the information to determine if a violation of the Code occurred based on a preponderance of the evidence. If the Hearing Administrator determines that a student violated the Code, the student will be found responsible, and sanctions will be imposed.

Failure to Appear

If a student fails to appear for the scheduled meeting, the Hearing Administrator has the option to dismiss the charges; set a new hearing date; or make a decision and impose sanctions, if appropriate, based on the information available.

The Decision Letter

Charged students will receive a decision letter via their university email account that includes the rationale for the finding(s), sanctions (if applicable), and information on the appeal process (if applicable). In certain circumstances, other parties or members of the university community may also be informed of the decision to the extent permitted by law and university policy. Unless otherwise noted in a student's records, the university reserves the right to notify a student's parents where permitted by university policy and applicable law.

DESCRIPTION OF STUDENT CONDUCT BOARD HEARINGS

When the severity of the alleged violation(s) could result in sanctions of suspension or expulsion, or if the facts of the incident are so complex that an administrative hearing is not appropriate, involved students will receive a hearing notice requesting their attendance at a prehearing, which precedes a Board hearing. In a Board hearing, the complainant and charged student come before a panel of three or five trained Board members to provide their account of the incident, answer questions, and provide information relevant to their case.

Notification

A prehearing meeting notice is sent to the student at their university email account. This notice will provide them with the date and location of the incident; the complainant and/or reporting party (where permitted by law and university policy); the alleged violation(s); and the date, time, and location of the prehearing meeting.

The PreHearing

The prehearing meeting is a one-on-one meeting between the student and Hearing Administrator to:

- Review the incident and written documentation (from which information about or identifying others may be redacted) that forms the basis of the complaint
- Explain the charges filed against the student
- Review the Board hearing process and its possible outcomes

In addition, students will have the option to review a list of current Board members and request the exclusion of potential Board members from the hearing panel. An explanation for this request must be supplied by the student and will be reviewed by the Hearing Administrator, who has discretion to resolve the request based on relevant considerations such as the reasons for the request and the interests of fairness and efficiency.

Third parties including but not limited to witnesses, lawyers, parents, guardians, and friends are not permitted to attend the prehearing meeting. Hearing Advisors may attend at the request of the student.

During the prehearing meeting, the charged student can either accept responsibility or contest responsibility for the charges. Upon request, a charged student can delay this decision for no more than two business days after the prehearing meeting. Students should note that accepting or contesting responsibility does not necessarily lessen or increase the sanctions that could be imposed.

- Accept responsibility—Students who accept responsibility for all charges proceed to an admitted responsibility meeting, scheduled for a later date. During the admitted responsibility meeting, the Hearing Administrator presents the case to at least two members of the Board who will ask questions to determine the most appropriate sanctions. The student may provide a verbal statement as well as additional written documentation to the Board.
- Contest responsibility—Students who contest responsibility for at least one of the charges proceed to a Board hearing, scheduled for a later date. Students will have an opportunity to clarify which charges they are contesting or accepting during the introductory statements of the hearing.

OSCCR reserves the right to refer all students from the same incident to a Board hearing for a resolution, regardless of an individual student's preference regarding acceptance or contesting of responsibility.

Preparing for the Student Conduct Board Hearing

Attendance at hearings is limited to parties involved and university officials as deemed necessary by the Board and/or OSCCR. Members of the Northeastern University Police Department or other law enforcement agency may be present at hearings. Attorneys, parents, or guardians are not permitted in Board hearings unless given express permission by OSCCR. Hearing Advisors may attend at the request of the student.

Written documentation—All parties involved have the opportunity to submit written documentation for the Board to review no later than two business days prior to the hearing.

Witnesses—Witnesses who have direct information regarding the incident may be presented by the complainant or the charged student, provided that the witnesses are identified in a list submitted to OSCCR two business days prior to the hearing. OSCCR staff

may issue a written request requiring the appearance of an individual before the Board if it is determined that the person's appearance is likely to provide important information for the Board regarding a student's case.

Failure to appear—If the complainant, charged student, or witness(es) fail to appear at the scheduled hearing, the Board or Hearing Administrator may dismiss the action; set a new hearing date; or continue the hearing without that party present and determine the finding and impose sanctions, if appropriate, based on available information.

Information Regarding the Student Conduct Board Hearing

1. The Board typically consists of three or five students representing undergraduate, graduate, online, law, and/or professional studies students. In cases involving graduate and professional studies students, a simple majority of the Board members will be graduate and/or professional studies students. Where deemed appropriate at the discretion of the director of OSCCR or designee, a Board hearing may instead proceed before a panel composed of three members of the OSCCR staff.
2. The chair will typically be a student and voting member of the Board whose responsibilities during the hearing will be to act as presiding officer at hearings and in all voting procedures.
3. A Hearing Administrator from OSCCR will be present during the hearing and all deliberations to provide information on applicable university policy and procedures. The Hearing Administrator does not vote or represent either party.
4. Board hearings are audio or video recorded for the purpose of appeals only. Parties to appeals may request to listen to the recording of the hearing in the OSCCR. Recordings are not to be removed from the OSCCR and are destroyed upon completion of the appeal process. Recordings do not become part of any student's record or any conduct file maintained by OSCCR.
5. Determinations of responsibility are made based on a preponderance of the evidence, or a "more-likely- than-not" standard, as determined by simple majority vote by the Board.
6. All records of a case will be treated as confidential and disclosed only to the extent permitted under applicable law and university policy.
7. All decisions made by a Board are subject to final approval or modification by the senior vice chancellor for student life, or designee.

Presentation of Information

1. Complainant's opening statement and perspective (the complainant is the individual(s) or the office affected by or representing the complaint issued to OSCCR).
2. Charged student's opening statement and perspective (a charged student is the individual(s) charged with a violation of the Code).
3. Questioning of complainant (charged student and SCB members).
4. Questioning of charged student (complainant and SCB members).
5. Statements from complainant's witnesses.
6. Questioning of complainant's witnesses (complainant, charged student, and Board members).
7. Statements from charged student's witnesses.
8. Questioning of charged student's witnesses (charged student, complainant, and Board members).
9. Scheduled break to attend to personal needs and prepare for final statements.
10. Final questions from the Board.
11. Complainant's closing statement.
12. Charged student's closing statement, including any statement as to mitigating circumstances were the student to be found responsible.
13. Complainant and charged student are excused so the Board can engage in closed-door deliberation and sanctioning, if necessary.
14. The Board may ask questions at any time during the hearing.

The Decision Letter

After the Board makes a determination and applies any appropriate sanctions, the charged student will receive a decision letter. The letter will include the rationale for the finding(s), sanction(s) (if applicable), and information on the appeal process (if applicable). OSCCR shall make reasonable efforts to issue the decision letter within 10–15 business days of the hearing. In certain circumstances, other parties or members of the university community may also be informed of the decision to the extent permitted by law and university policy. Unless otherwise noted, the university reserves the right to notify a student's parents where permitted by university policy and applicable law.

Procedures for Student Appeals

Students have five business days from the date of their decision letter to appeal the decision of either the Hearing Administrator or the Board.

All conduct hearing appeals will be heard by the Appeals Board, which consists of three voting members: one representative from Academic Affairs, one representative from Student Life, and a trained student representative.

The director of OSCCR, or designee, will serve as an advisor of the Appeals Board. When a current participant of a Global Experience Office program or a student organization files an appeal, a staff member of those respective programs will join the Appeals Board.

Appeals must be made in writing using the electronic Appeal Request form and must demonstrate one of the following grounds for appeal:

Procedural error—The student asserts a procedural error impaired their right to a fair opportunity to be heard.

New information—Information has arisen that could not reasonably have been made available during the original hearing and may have been sufficient to alter the Board/Hearing Administrator's decision.

Review of sanctions—The student requests a review of the imposed sanction(s), citing undue hardship caused by sanctioning or individual extraordinary circumstances.

The appeals process is primarily a paper process and will not involve a meeting with the charged student or other persons unless requested by the Appeals Board.

The Appeals Board will review the electronic appeal submitted by the appealing party, the documentation from the original case, and any other information deemed necessary by OSCCR. The audio or video recording of the original hearing (in the case of Board hearings) will be made available to the Appeals Board.

PLEASE NOTE: The submission of an Appeal Request form will not stay the effect of sanctions imposed by the Hearing Administrator or the Board/ Title IX/Sexual and Gender-Based Harassment Board. The Appeal Request form may request that sanctions imposed be stayed, or modified, pending the determination of the appeal, and the reasons for such request are to be set forth within the Appeal Request form. The senior vice chancellor for student life, or their designee, at their discretion may suspend, stay, or modify sanctions imposed, subject to such conditions as they may deem appropriate.

The Appeals Board will take one of the following actions:

- Concur with original decision.
- Refer the matter to the appropriate hearing body if based on a procedural error. In this case, the entire case will be reheard, as if it had not been heard before.
- Refer the matter back to the original hearing body if based on the grounds of new information. The original body; complainant; charged student; and, if required, witnesses, will be reconvened to review only the new information. The hearing body will then render a decision considering the new information.
- Mitigate the sanction. Students should understand that this option is exercised only in rare circumstances. The university reserves the right to take any action necessary to corroborate the student's statements.

All decisions of the Appeals Board may be recommended to the senior vice chancellor for student life, or designee, for final approval.

Standards of Conduct

Potential student conduct charges are listed below. Students are required to be familiar with applicable standards, policies, and regulations, as well as with all university, campus, program, and departmental requirements, and must comply with them. Violations of any of these standards will be handled in accordance with the appropriate university procedure.

The use and/or abuse of alcohol and/or drugs will not be considered a mitigating circumstance for any violation of the Code. Rather, individuals may be additionally charged with the appropriate alcohol or drug violation. For information regarding standards of conduct related to sex-based harassment and misconduct, including the definition of consent and the definitions of prohibited offenses, please refer to the university's Policy on Sexual and Gender-Based Harassment and Title IX (<https://policies.northeastern.edu/policy104/>).

Violations are listed in alphabetical order; the order of violations is not indicative of the seriousness of each violation. Repeated violations, multiple violations, or the severity of the misconduct may heighten the university's response, which could include suspension or expulsion from the university and/or cancellation of the Residence Hall and Dining License Agreement.

Where permitted by applicable law and university policy, the university reserves the right to notify parents when a student has been referred to OSCCR.

ACADEMIC INTEGRITY

As defined in the Academic Integrity Policy (p. 88).

AIDING AND ABETTING

Knowingly assisting with or cooperating in an act or action that violates the Code. A student may be held responsible as though the student were a direct participant in the violation, even if information indicates the student was not directly involved in the perpetration of the violation.

ALCOHOL, MARIJUANA, OTHER DRUGS, AND MEDICAL AMNESTY

The university expects that all of its students, whether on or off campus, abide by the law and university regulations concerning alcohol and drug use.

Alcohol

1. A person under the legal drinking age as defined by local law is prohibited from being in the presence of alcoholic beverages in the residence halls and housing provided and/or arranged by Northeastern, with the following exception: An individual under the legal drinking age who has a roommate of legal drinking age may be in the presence of an open container of alcohol in the room only if the roommate of legal drinking age is also present. Non-roommates who are under the legal drinking age may not be in the room when alcohol is being consumed by the of-age roommate.
2. A person under the legal drinking age is prohibited from possessing empty alcohol containers.
3. For non-university-sponsored events at which alcohol will be served or consumed, no postings, announcements, promotions, or ticket sales may be made, placed, or distributed on university-owned or -leased property.
4. On-campus possession of a keg, beer ball, alcohol by the case, other central sources of alcoholic beverages, or other unauthorized quantities of alcohol is not permitted. Personal possession of alcoholic beverages is limited to one 12-pack of beer (144 ounces/4.26 liters) OR one-half gallon (64 ounces/1.89 liters) of wine OR one pint (16 ounces/470 milliliters) of hard liquor.
5. Possession or consumption of alcoholic beverages in locations or under conditions prohibited by university policy or by law:
 - a. A person must be of legal drinking age to possess or consume alcoholic beverages.
 - b. An individual of legal drinking age may possess and/or consume alcohol only in the student's residence hall room or in the residence hall room of another resident who is of legal drinking age and present in the room, provided alcohol is permitted in that residence hall for students of legal drinking age.
 - c. Prohibited locations include but are not limited to hallways, lobbies, lounges, stairwells, classrooms, studios, technical facilities, auditoriums, bathrooms, outdoor areas, vehicles, or any other public areas without authorization.
6. The possession or use of items that encourage heavy alcohol consumption is prohibited (examples could include alcohol funnels, AWOL or Alcohol Without Liquid, generators or vaporizers, BORGs, etc.), regardless of age.
7. Providing alcohol to anyone under the legal drinking age and/or allowing anyone under the legal drinking age to consume alcohol in on- or off-campus residences.
8. Distribution, sale, or manufacture of alcohol.
 - a. Manufacturing alcohol on university-owned or -leased property.
 - b. Selling alcohol without a liquor license, including but not limited to the sale of cups and/or any other form of container for the distribution of alcohol.
 - c. Distributing alcohol includes providing a central source or large quantity of alcohol.

Drugs

1. Knowingly being in the presence of illegal drugs.
2. Possession or consumption of illegal drugs (including marijuana), salvia divinorum, prescription medications belonging to another individual or over-the-counter substances, nitrous oxide, or other available substances to "get high" or induce a mind-altering state.
3. Possession, use, manufacture, distribution, or sale of drug paraphernalia or other items used in preparing or consuming illegal drugs (including marijuana).
4. Promotion of illegal drugs (including marijuana).
5. Providing or sharing drugs.
6. Distribution, sale, or manufacture of drugs (marijuana, mushrooms, prescription drugs, etc.).
 - a. Manufacturing or cultivation of drugs, on or off campus.
 - b. Sale or distribution of drugs or intention of sale or distribution.

Medical Amnesty

In cases of a drug or alcohol emergency, the primary concern is the health and safety of the individual(s) involved. Students/organizations are strongly encouraged to call the appropriate campus safety or emergency resources for medical assistance for themselves or for another student who they observe to be or feel is dangerously intoxicated/under the influence of drugs. If a student/organization calls on behalf of another student, that student/organization is required to remain with the student experiencing the emergency until medical assistance arrives. Neither the caller nor student requiring medical assistance for an alcohol or other drug-related emergency will be subject to university disciplinary action for the violation of possession or consumption of alcohol or drugs. This policy shall extend to the parties actively involved in proactively calling for medical assistance and is determined at the discretion of the director of OSCCR.

The student requiring medical assistance (and possibly the referring student(s)/organization) will receive medical amnesty and will have a confidential "check-in" meeting with a staff member from the Office of Prevention and Education at Northeastern. The student may also be contacted by various campus departments (e.g., WeCare and Northeastern University Police Department) for an optional follow-up conversation regarding the incident. As long as the student(s)/organization complies with all directives, there will be no disciplinary action taken related to the violation of possession or consumption of alcohol or drugs and no disciplinary record of the incident kept in the OSCCR. This policy applies only to those students or organizations who seek emergency medical assistance in

connection with an alcohol or drug-related medical emergency and does not apply to individuals experiencing an alcohol or drug-related medical emergency who are found by university employees (e.g., Northeastern University Police, faculty, administrative staff, or residence hall staff) or where the reporting student(s)/organization did not stay with them.

The Medical Amnesty Policy is not intended to shield or protect those students or organizations that repeatedly violate the Code. When repeated instances of drug or alcohol emergencies occur, the university reserves the right to take disciplinary action on a case-by-case basis regardless of the manner in which the incident was reported.

Medical amnesty applies only to alcohol or other drug-related emergencies, but it does not apply to other conduct violations such as but not limited to assault, property damage, or distribution of illicit substances. If other violations occur, then a student may face disciplinary charges for those violations. The use or abuse of alcohol or drugs is not considered a mitigating circumstance for any other violations of the Code. Medical amnesty applies only to the university response to a medical emergency. The Medical Amnesty Policy applies only to OSCCR proceedings and does not affect any separate law enforcement actions or criminal proceedings.

BIAS-RELATED INCIDENTS

Conduct prohibited by this Code may include but is not limited to harassment, bullying, abuse of others, disorderly conduct, and vandalism that is motivated in whole or part by prejudice toward an individual's or group's real or perceived race, color, religion, religious creed, genetics, sex, gender, gender identity, gender expression, sexual orientation, age, national origin, ancestry, veteran status, or disability.

BREAKING AND ENTERING

Attempted, actual, or forcible access to property.

BULLYING

A verbal, electronic, or physical act or gesture or the repeated use of written, verbal, or electronic expression or communication or any combination thereof that causes or is intended to cause physical, psychological, and/or emotional harm to another person or damage to property; places a university community member in reasonable fear of harm or damage to property; or creates a hostile, threatening, intimidating, humiliating, or abusive environment for a university community member or substantially interferes with academic performance, opportunities, or benefits. For purposes of this section, bullying may include but is not limited to social exclusion or isolation, humiliation or degradation, threats, intimidation, harassment, stalking, theft and/or damage/destruction of property, or the perpetuation of any of the conduct listed in this section by inciting, soliciting, or coercing others to demean, embarrass, humiliate, or cause emotional, psychological, or physical harm to a member of the university community.

DANGEROUS WEAPONS

Possession or use of items that could be used or are used to threaten another individual with physical harm in violation of the university's Policy on Weapons on Campus (<https://policies.northeastern.edu/policy604/>). Those items include but are not limited to nunchakus (karate sticks), switchblades, knives, fake guns, tasers, BB guns, fireworks, ammunition, explosive devices, or firearms, except under official supervision as part of a recognized student activity.

DISORDERLY CONDUCT

Conduct that is disorderly and/or disruptive in nature and negatively affects the campus community, the neighborhood, and/or community members.

DISRUPTIVE GATHERINGS

Hosting or attending a disruptive gathering, whether on or off campus. Examples include but are not limited to gatherings that result in a noise complaint and/or police response, those that are disruptive to neighbors in any way, and/or excessive attendance beyond what is safe and/or reasonable. For off-campus gatherings, expectations include following all local ordinances.

DOXING

Publishing or distributing personal identifying information about another person with intent to place the other person in reasonable fear of harm to themselves or their family or for the purpose of causing or encouraging unwanted physical contact, injury, or harassment of the person by others.

ENDANGERING BEHAVIOR

Conduct demonstrating that the student constitutes a threat to self or others, or to the proper functioning of the university, including but not limited to threats, excessive consumption of drugs and/or alcohol, intoxication, bypassing security measures, dropping items from a window, and using any item to cause fear and intimidation and/or injury to another.

EXCESSIVE CONSUMPTION

Excessive consumption of alcohol is prohibited regardless of age. Being under the influence of and/or the abuse of drugs is prohibited.

Behavioral symptoms frequently associated with excessive consumption or intoxication may include but are not limited to impaired motor-skill coordination, difficulty communicating, vomiting, glazed/red eyes, the smell of alcohol on one's breath, verbal and/or physical aggressiveness, destructive and/or disruptive behavior, and engaging in any behavior that may endanger oneself or others.

FAILURE TO COMPLY

1. Failure to comply with or violation of the terms of an imposed disciplinary sanction.

2. Failure to follow the reasonable directions of university officials (including Northeastern University Police Department officers and faculty and staff at Northeastern), law enforcement agents, cooperative work assignment employers, or officials at other colleges and universities that are necessary for the proper conduct of the university and university community.

FAILURE TO PRODUCE NORTHEASTERN STUDENT IDENTIFICATION

All students must identify themselves by showing a Northeastern University Husky Card upon request by any university personnel or authorized personnel, including Northeastern University Police Department personnel. The Husky Card is the official identification card at Northeastern and is issued to all students. Students wearing a mask may be asked to adjust their mask for identity verification.

FIRE SAFETY

Breaching campus fire safety or security through:

1. Setting a fire (including charring, burning, lighting of papers, or any other act that could cause a fire), making a bomb threat, causing or creating a false alarm, or other such intentional or reckless conduct that causes harm or reasonable fear of harm to persons or property.
2. Misusing, tampering, or damaging fire safety equipment (including alarm systems, alarmed fire safety doors, smoke detectors, or fire extinguishers).
3. Failure to vacate university buildings during or after a fire alarm.
4. Entering or reentering a building during a fire alarm.

FORGERY

Falsification, alteration, or misuse of documents or records (including but not limited to parking permits, software, computer databases and/or systems, and/or email).

GAMBLING

Unlawful engaging in, playing, operating, or assisting in operating a game of chance for money (or some other stake) or the sale of lottery or raffle tickets, as prohibited by applicable law.

HARASSMENT

Repeated and/or continuing unwanted behavior, coercion, or intimidation of an individual or group, either directly or indirectly.

HAZING

Violation of the university's Policy Prohibiting Hazing (<https://policies.northeastern.edu/policy606/>), which includes any action taken or situation created, whether voluntary or involuntary, for the purpose of initiation, admission into, affiliation with, or as a condition for continued membership in a group or organization that endangers the mental or physical health or safety of a student; creates risk of injury; causes mental or physical fatigue or distress, discomfort, embarrassment, harassment, ridicule, or intimidation; causes damage to or destruction of property; or which is a violation of law, university policy, or the Code of Student Conduct. Such activities include but are not limited to striking another student by hand or with any instrument; requiring or advocating alcohol or other drug use; late sessions/meetings that interfere with academic activities; tattooing, branding, or piercing; physical or psychological shocks; wearing of apparel in public that is embarrassing, humiliating, or degrading; or games/activities causing or resulting in fatigue, sleep deprivation, mental distress, panic, embarrassment, or humiliation. Activities that generally would not be considered hazing include agreeing to maintain a specific GPA, comply with a dress code for a team/organizational function, participate in volunteer community service, participate in a team/organizational trip, take an oath, or sign a contract of standards.

Note: While some behaviors constitute hazing regardless of context (e.g., paddling, use of alcohol), others depend on the circumstances. For example, requiring athletes to perform normal calisthenics as part of conditioning would not be hazing, but requiring new members of a nonathletic student organization to do push-ups in the middle of the night would constitute hazing. Hazing can result in a range of sanctions against organizations/teams and/or individuals that range from educational interventions to suspension or expulsion. A nonexhaustive list by category is shown below to detail further examples of conduct that could be deemed hazing:

- **Sexualized or Inappropriate Acts**
 - Sexual simulations
 - Forced or coerced sexual acts
 - Requiring participation in lewd conduct
 - Compromising or degrading situations involving nudity or sexuality
- **Forced Servitude/Errand Running**
 - Personal errands or acts of servitude (e.g., forced cleaning, carrying books, fetching food)
 - Assignment of duties not assigned to other members
- **Coerced Financial Expenses**
 - Requiring the purchase of items or services
 - Financial exploitation or excessive dues under threat of social exclusion
- **Verbal Abuse and Degrading Language**
 - Verbal abuse, name-calling, or degrading, threatening language
- **Coercing Illegal Activity**

- Theft, trespassing, vandalism
- **Mental Abuse**
 - Social isolation
 - Forced silence or blindfolding for extended periods
 - Creating fear through mock interrogations or rituals
- **Others**
 - Consumption of unpalatable substances or palatable substances to excess
 - Engage in acts relevant to those of the group (for example, practice or training activities), but in a manner that a reasonable person would consider excessive or dangerous
 - Is known to be contrary to a prospective or new member's moral or religious belief
 - Requiring situationally inappropriate attire
 - Kidnapping

INAPPROPRIATE IDENTIFICATION

- 1 . The manufacturing, production, and/or distribution of any fake identification.
- 2 . Use of identification other than your own or possession of a false or altered ID.
- 3 . Representing yourself as someone other than who you are.
- 4 . Duplicating, lending, or borrowing of any official identification including but not limited to Husky Cards, student identification numbers, university marks and logos, and driver's licenses.
- 5 . Impersonating a university official.

MISREPRESENTATION OF INFORMATION

Falsification, distortion, or misrepresentation of information to the university or its officials (including Northeastern University Police Department officers and faculty and staff at Northeastern), law enforcement agents, cooperative work assignment employers, or officials at other colleges and universities that is intended to mislead in investigations or administrative processes or could adversely affect the mission or operations of the university.

MISUSE OF ELECTRONIC RESOURCES

Misuse of electronic systems or methods (for example, email "hacking") to steal, misrepresent, threaten, harass, or bully (including online aggression or cyberbullying) or violations of the Policy on Appropriate Use of Computer and Network Resources (<https://policies.northeastern.edu/policy700/>) and/or any other computer or system use restrictions.

NOISE

Disturbances in residence halls, on campus, or in neighborhoods caused by a loud or disruptive sound.

PHYSICAL ABUSE

Physical abuse of others, including but not limited to fights and/or injury caused by endangering behavior.

RETALIATION

Any intentional or attempted act that results in an adverse or negative effect on a person who in good faith makes a report, serves as a witness, or participates in an investigation or hearing regarding a violation of the Code or other university policy.

RIOTING

Inciting, participating in, or encouraging any disturbance for purposes of committing any action that presents a clear and present danger to self or others, causes physical harm to persons, or vandalizes or destroys property.

SMOKING

Smoking of any tobacco products is prohibited at Northeastern. This includes but is not limited to cigarettes, cigars, cigarillos, smokeless tobacco, electronic cigarettes, pipes, vaping pens, bidis, hookahs, chewing tobacco, and snuff. This does not include cessation tools such as nicotine gum or patches. Refer to the university Policy on Tobacco and Smoke-Free Campus (<https://policies.northeastern.edu/policy607/>).

THEFT

- 1 . The taking of property not owned by oneself.
- 2 . Attempted or actual theft of property.
- 3 . Attempted or actual theft of identity or services.
- 4 . The unauthorized use of ATM, phone, or credit cards; checks; Northeastern ID cards; or computer systems (including violation of the Policy on Appropriate Use of Computer and Network Resources (<https://policies.northeastern.edu/policy700/>)).

UNAUTHORIZED ACCESS OR USE

Unauthorized access or entry to, into, or onto any property owned or operated by the university or any private or restricted property.

UNAUTHORIZED USE/POSSESSION OF OTHER'S PROPERTY

Unauthorized use or possession of another's property.

UNAUTHORIZED USE OF UNIVERSITY IDENTIFICATION MARKS

Unauthorized use of the university's name, logo, or other identifying mark, including but not limited to postings, letterhead, websites, pamphlets, social media, etc. Please refer to the university Policy on Endorsements and Use of University Identifiers (<https://policies.northeastern.edu/policy116/>).

UNIVERSITY GUEST POLICY

Failure to control guests on campus or at university-sponsored events. Refer to the Residence Hall and Dining License Agreement (<https://housing.northeastern.edu/license-agreement/>) and/or Guide to Residence Hall Living (<https://housing.northeastern.edu/policies-and-publications/>) for specific regulations regarding guests in residence halls. If a guest violates university policy, the host may be held accountable for actions of the guest. The level of sanctioning for the host may be dependent upon the nature of the incident(s).

VANDALISM

Destruction or defacement of public or private property.

VIOLATION OF CENTER FOR SPIRITUALITY, DIALOGUE, AND SERVICE GUIDELINES

Failure to abide by the Guidelines and Policies set forth by the Center for Spirituality, Dialogue, and Service (<https://spirituallife.northeastern.edu/student-groups/>).

VIOLATION OF CENTER FOR STUDENT INVOLVEMENT GUIDELINES

Failure to abide by the rules and regulations set forth by the Center for Student Involvement and/or included in the *Student Organization Handbook*.

VIOLATION OF GUIDE TO RESIDENCE HALL LIVING

Failure to abide by the rules and regulations set forth for all residential students and stated in the Guide to Residence Hall Living (<https://housing.northeastern.edu/policies-and-publications/>).

VIOLATION OF LAW

Any action or behavior that violates federal, state, or local law.

VIOLATION OF PROFESSIONAL CONDUCT IN DEGREE PROGRAM

Failure to fulfill the guidelines and/or expectations of an academic degree program. Examples include but are not limited to failing to complete an internship, acting in an unprofessional manner (as defined by the degree program), etc.

VIOLATION OF THE N.U.IN PROGRAM POLICIES

Failure to abide by the rules and regulations set forth for all N.U.in participants and/or established in conjunction with N.U.in partner institutions.

VIOLATION OF UNIVERSITY POLICIES

Violation of any university policy, rule, or regulation within this handbook, published in hard copy, or available electronically on the University Policies (<https://policies.northeastern.edu>) website.

Sanctions

Sanctions are imposed to strengthen learning and assist students/organizations in adopting behaviors in order to avoid repeat violations.

In determining appropriate sanctions, Hearing Administrators and/or boards look at the totality of the incident(s)/situation and its impact on the community rather than looking at individual violations. In addition, they consider/weigh the impact of the following:

- 1 . Nature of the violation(s)—what happened?
- 2 . Severity of the impact caused (damage, injury, or harm, etc.) from this incident.
- 3 . Charged student's student conduct record, which could increase the severity of sanctions imposed for incident in question.
- 4 . Mitigating circumstances.
- 5 . Aggravating circumstances, which may include bias motivation.

Once these factors have been taken into consideration, Hearing Administrators and/or boards will look to impose at least one inactive sanction and at least one active sanction. In many instances, more than one active sanction will be imposed. A list of possible sanctions

follows. Hearing administrators and/or boards reserve the right to create active sanctions not included on this list if they determine that the sanction better addresses the concern and provides an appropriate opportunity for learning.

Inactive: May affect students' good standing with the university and may not require any sort of action on the part of the student.

1. Expulsion is the permanent separation of the student from the university. Students are permanently banned from entering all university property and prohibited from participating in any university-sponsored activities. A permanent notation, "Withdrawn Expelled (WE)," will appear on the student's transcript.
2. Suspension is the separation of the student from the university for a specified period of time, after which the student is eligible to return. Conditions for readmission may be specified. During the period of suspension, students are banned from entering all university property, may not live in university housing, and are prohibited from participating in any university-sponsored activities. Students are expected to adhere to all university policies while on suspension and will be held accountable for any violations during the period of suspension. Students will not be granted credit for any academic work during the period of suspension (including a cooperative work assignment). A student will continue on disciplinary probation for a specified period of time following the completion of suspension.
3. Deferred suspension is the most serious formal warning for violation of university rules/regulations that affects the student's good standing with the university. Students on deferred suspension may be limited in their ability to attend university programs, including those outside the country, during the period of deferred suspension. Deferred suspension is for a designated period of time. If the student is found responsible for violating any additional university policy, rule, or regulation during the period of deferred suspension, suspension may become effective, and the student may be subject to additional sanctions for the additional violation. Restrictions and/or conditions regarding participation in university-sponsored activities may be imposed. Students on deferred suspension may be members of organizations but may not hold any elected or appointed position in any recognized student organization or group, represent the student body on any university committee, or serve the university in other leadership positions. A student will continue on disciplinary probation for a specified period of time following the completion of deferred suspension.
4. University disciplinary probation is a formal warning for violation of university policies, rules, or regulations. Probation is for a designated period of time during which a student is not in good conduct standing with the university and may be subject to the imposition of more severe sanctions if found in violation of any university rules/regulations during the period of probation. University probation may be imposed with or without additional restrictions. The probation period is not noted on the student's transcript but may limit a student's opportunities to participate in a program as determined by a department or office (e.g., students on university probation cannot serve in a resident assistant role).
5. Written warning is a formal warning for violation of university policies, rules, or regulations and cautions students that continuation or repetition of prohibited conduct may result in more serious sanctions. The university does not consider a written warning to constitute a disciplinary record.
6. Cancellation of the Residence Hall and Dining License Agreement results in the separation of the student from university residence facilities either permanently or temporarily. Upon the cancellation of the agreement, the student is banned from entering all university residence facilities during the specified period of separation. *PLEASE NOTE:* Students required to leave the residence halls and/or the campus as a result of disciplinary action will not be eligible for a refund of tuition, housing, board, or other charges regardless of date of removal.
7. Loss of privileges and restriction on activities and programs means the loss and/or withdrawal of services or privileges as a student or member of the community or the loss of the privilege to participate in an activity, program, or event. Examples include but are not limited to restriction from holding positions of leadership in university-recognized student groups, clubs, and/or organizations or from being hired by programs/departments to serve in leadership roles; restriction from attendance at university events or activities including but not limited to campus programs, commencement, sporting events, etc.; restriction from the use of university resources; restriction of entry or access to particular locations, premises, or events; restriction on ability to study abroad including but not limited to traditional study-abroad programs, Dialogues of Civilization, mobility programs, co-op participation, etc.
8. Restriction of guest privileges with respect to hosting guests on campus, including in a residential facility, may be restricted or revoked for a specified period of time.
9. Deferred housing contract cancellation serves as a final warning in cases where a student's actions have negatively affected the university spaces within which they reside. Any further violation(s) may result in the cancellation of the student's housing contract.
10. Permanent loss of external privileges indicates that a student is no longer eligible to participate in any external program during the duration of their time at Northeastern. As a condition of permanent loss of external program privileges, a student is not permitted to visit any external program location without written authorization from OSCCR. Failure to comply with the conditions of this sanction are subject to additional disciplinary action and/or arrest. This sanction will not be notated on a student's transcript.
11. Other appropriate and alternative outcome information may include but is not limited to interim action pending a hearing and/or investigation, assignment of educational projects, referral to other offices or departments for ongoing guidance and support, specialized restorative projects, and additional restriction of university privileges, including but not limited to the restriction from university facilities or programs. These sanctions will not be notated on a student's transcript.

12. Northeastern reserves the right to delay the awarding of a degree, certificate, badge, or other credential pending the resolution of the student conduct process.
13. Northeastern reserves the right to withhold the awarding of any degree for academic and nonacademic misconduct.
14. Northeastern reserves the right, at its discretion, to revoke a degree.

Active: Requires student to take action.

1. Loss of membership in teams, clubs, and/or officially recognized organizations.
2. Loss of ability to hold any elected or appointed positions in any recognized student organization or group, represent the student body on any university committee, or serve the university in other leadership positions. Students may be members of organizations and may run for office while on this status but may not take office while it is in effect.
3. Loss of access to university buildings, facilities, or resources for a specified period of time or permanently.
4. Mandated service.
5. Restitution, which requires the student to make payment to the university or to specified individuals, groups, or organizations for costs incurred as a result of violation of university rules/regulations.
6. Loss of guest privileges on campus or in residence halls.
7. Submission of letter of apology to complainant/affected party.
8. Counseling evaluation.
9. Educational sanction, which may include but is not limited to attending a program, developing a program, and/or writing a paper. Students may be charged a fee to attend an educational program.
10. Fines for alcohol and drug cases. At the student's request, mandated service may be completed in lieu of paying the fine.

The university also reserves the right to sanction any student who is found responsible, pleads no contest, or is found guilty in a court of law for a violation of law. In these instances, disciplinary action will be administered through OSCCR and will not be processed by the Board.

In addition, students should review their financial aid and scholarship information to get clarification on those policies.

While the Hearing Administrator and/or the Board have discretion to impose sanctions they determine most appropriate based on the considerations described above, the Code provides sanctioning guidelines for drug and alcohol violations. The sanctions set forth below provide Hearing Administrators with a starting point for sanctioning cases involving alcohol and/or drugs. Depending on the information obtained through the hearing and the severity of the harm, the imposed sanctions may be enhanced or lessened. Students found responsible for violating the Code risk the cancellation of their Residence Hall License and Dining Agreement.

SANCTION GUIDELINES FOR POSSESSION/CONSUMPTION OF ALCOHOL

First violation:

- Disciplinary probation
- Mandatory completion of an alcohol education program
- Fine of \$100 or 10 hours mandated service

Second violation:

- Deferred suspension from the university
- Mandatory completion of an alcohol education program
- Fine of \$200 or 20 hours mandated service

Third violation:

- Suspension from the university
- Mandatory alcohol counseling to be completed off campus

SANCTION GUIDELINES FOR POSSESSION/CONSUMPTION OF MARIJUANA

First violation:

- Disciplinary probation
- Mandatory completion of a marijuana education program
- Fine of \$100 or 10 hours mandated service

Second violation:

- Deferred suspension from the university
- Mandatory completion of a marijuana education program
- Fine of \$200 or 20 hours mandated service

Third violation:

- Suspension from the university
- Mandatory drug counseling to be completed off campus

SANCTION GUIDELINES FOR POSSESSION/CONSUMPTION OF OTHER DRUGS

First violation:

- Deferred suspension from the university
- Mandatory completion of a drug education program
- Fine of \$200 or 20 hours mandated service

Second violation:

- Suspension from the university
- Mandatory drug counseling to be completed off campus

A letter may be sent home to a parent/legal guardian when a student under 21 years of age is found to have violated laws or policies concerning the use or possession of alcohol or controlled substances.

Parent/Guardian Notification

Northeastern reserves the right to notify parent(s)/guardian(s) about aspects of student conduct matters to the extent permitted by university policy and applicable law. The university may notify parent(s)/guardian(s) in matters including, without limitation, certain cases involving alcohol or drugs and matters that pose a threat to the health or safety of the student and/or other individuals.

Interim Suspension

The senior vice chancellor for student life, or their designee, may impose an interim suspension on a student if sufficient facts indicate that the student presents a threat to the university community. In most instances, a student who has an interim suspension from the university will be immediately banned from the university community. Interim suspension may include restrictions on class attendance, access into residence halls, and/or access to or use of university-owned or -operated property. The senior vice chancellor for student life, or their designee, may remove the interim suspension.

Students who have an interim suspension from the university will have a hold placed on their record and will need to make advance arrangements with OSCCR for approval any time they may need to be on campus to take care of university-related business during the period of the interim suspension.

In cases involving interim suspension, efforts will be made, if practicable, to conclude the hearing and obtain a decision on the charges within 10 business days after the interim suspension was imposed.

Other Interim Action

If upon review of a report Northeastern determines that an individual(s) is considered an imminent threat to the community, or when advisable to protect the physical, social, or emotional well-being of the university community, the senior vice chancellor of student life, or designee, may invoke interim administrative measures that can include but are not limited to loss of privileges and restrictions on activities, immediate residence hall relocation or suspension, immediate suspension from the university, and any other action deemed necessary to support students and/or this campus community or university community pending the outcome of the conduct process.

No Contact Order

When the university determines the severity of an incident rises to the level where continued contact between the involved parties could lead to further incidents and/or the creation of an unhealthy, unsafe, and/or hostile environment, OSCCR may impose a no contact order on the parties involved with the incident. Communication of the order will be made via email to the student's Northeastern email account.

Temporary Measures Administrative Directive

If a student or student organization is acting in such a way that may prove to be a violation of the Code, the senior vice chancellor for student life, or designee, may issue an administrative directive prohibiting the continuation of such behavior. It is not necessary for there to be current ongoing proceedings or even charges against the student or student organization when an administrative directive is issued.

A designated university administrator may issue an administrative directive, according to the guidelines listed, when harm is deemed to be occurring and immediate action is deemed necessary. OSCCR will enforce the directive.

1. A designated university administrator may issue an administrative directive:
 - a. To prevent a student or student organization from acting in specified ways that may result in violations of the Code. The designated university administrator may also prevent a student or student organization from committing an act that would negatively impact or interfere with OSCCR proceedings or any other similar proceedings.

- b. To restrain a student or student organization from assuming or exercising privileges granted to them by the university, pending action, until a final judgment can be rendered.
2. In order to receive an administrative directive, the prohibited action must be within the jurisdiction of the administrator, or designee, issuing such an order.
3. The designated administrator determines the date that the administrative directive expires, a period that initially will not exceed 10 days. The 10-day period may be extended, in consultation with the designated administrator's immediate supervisor, or if the restrained party consents to an extension.
4. Administrative directives will specify the reasons for the directive, the act or acts that are prohibited, and the student or organization bound by such directive.

Maintenance of Student Conduct Records

1. The university will permanently maintain the conduct records of those students separated from Northeastern by suspension or expulsion. A notation will be placed on the transcript of any student expelled from the university. A hold will be placed on the account of any student that withdraws, takes a leave of absence, or becomes inactive prior to the resolution of disciplinary charges. Such hold may not be lifted until the pending charges are resolved.
2. The university will expunge the conduct records of those students who received sanctions other than suspension or expulsion three years after the student's withdrawal or immediately upon their graduation date from Northeastern.
3. Written warnings are maintained in student conduct records as provided above for internal use by OSCCR. The university does not consider such warnings to constitute disciplinary records.
4. Students have the right to submit any documentation in their conduct file to amend a record they believe to be inaccurate or misleading.
5. If Northeastern notes a sanction on a transcript, this notation will not describe the violation or incident that resulted in the sanction. If a student voluntarily takes a leave or withdraws with an OUEC compliance complaint pending against them or a Code violation pending for conduct that reportedly harmed other individual(s) or the community, Northeastern will note the following on the student's transcript: "Voluntarily withdrew [day/month/year], with disciplinary charges pending. This notation does not constitute a finding or admission of responsibility." This notation will remain on the student's transcript until the charge or complaint is resolved.
6. Please refer to the university's privacy information (<https://www.northeastern.edu/privacy-information/>) and Policy on Student Rights Under The Family Educational Rights and Privacy Act (FERPA) (<https://policies.northeastern.edu/policy106/>) for more information regarding the disclosure of student records.

Interpretation and Application

1. Any question of interpretation or application of the Code shall be referred to the director of OSCCR, or designee.
2. The Code and its related procedures do not preempt or supplant any similar rules and regulations maintained by individual colleges, programs, departments, or offices. For example, student-athletes and members of student organizations must also abide by the policies of the Athletics Department and the Center for Student Involvement, respectively. Any proceedings under such policies may run concurrently with those described herein.
3. Nothing in this handbook limits the university's right to take any action it deems necessary to comply with applicable local, state, and federal law.

Course Credit Guidelines

Guidelines for Assigning Credit to Courses

The primary standard for establishing course credit at Northeastern University is the semester/quarter hour, or Carnegie Unit, the standard used by the federal government. One hour of credit is awarded for a lecture/seminar class meeting 50 minutes each week during a 15-week semester or 12-week quarter and also requiring a minimum of two hours of outside preparation each week by the student. An hour of contact time in the rest of the document is based on this 50-minute session.

- 2 semester/quarter hours (100 minutes per week of instruction plus 4–6 hours homework, or equivalent)
- 3 semester/quarter hours (150 minutes per week of instruction plus 6–9 hours homework, or equivalent)
- 4 semester/quarter hours (200 minutes per week of instruction plus 8–12 hours homework, or equivalent)

The Office of the University Registrar (<https://registrar.northeastern.edu/>) maintains the official record for all courses. In the event of error in any publication, the academic record will reflect the correct semester/quarter hours applicable to any degree requirement.

On occasion, course titles change, while the course number remains the same. Despite such title changes, the course is still considered to be the same course. Students who have taken the course under the old title and then take the course again under the new title are considered to have repeated the course.

NOTE ABOUT HOMEWORK AND STUDENT PREPARATION FOR CLASS

The credit hour assumes a set proportion of two hours of student preparation or homework for every hour spent in class. Northeastern wishes to emphasize that the federal government has established this as the minimum amount of work expected, and assigning more work does not in itself justify an increase in the credit value of the course. We also wish to note that there is great variation in the amount of time each student will need to devote to each course or to a specific form of study (e.g., reading, writing, completing problem sets), and, therefore, it is not possible to enforce any exact accounting of student work outside of class.

CREDIT ASSIGNMENT PROCESS

Northeastern uses the Carnegie Unit to determine class meeting time requirements. The actual amount of academic work that goes into a single credit hour is calculated as follows:

- One lecture (taught) or seminar (discussion) credit hour represents one hour per week (50 minutes) of scheduled class/seminar time and two hours of student preparation time.
- One laboratory or studio credit hour represents one hour per week of lecture or discussion time plus one to two hours per week of scheduled supervised or independent work, or a total of three hours in the lab or studio.

DEFINED INSTRUCTIONAL METHODS

- Traditional: meets fully on ground in a physical location with instructor present
- Hybrid: meets majority on ground in a physical location with instructor present with some online instructional component
- Live cast: meets fully on ground in a physical location with the instructor in a different location teaching synchronously and supported by an instructional assistant in the physical location
- Online: meets fully online

FULL-TIME AND HALF-TIME EXPERIENCES

Academic experiences integral to curriculum and requiring registration (but not credit bearing) have the following required hours of participation:

- Full-time experiences: 32–40 hours per week in a semester for a minimum of 11 weeks or 55 days, or in a quarter for 9 weeks or 45 days
- Half-time experiences: 16–31.99 hours per week in a semester for a minimum of 11 weeks or 55 days, or in a quarter for 9 weeks or 45 days (to achieve full-time status, graduate students must take 3 or more academic credits and undergraduate students must take 4 or more academic credits)
- Summer 1 or Summer 2 semester: minimum of 5 weeks or 25 workdays
- Summer quarter: 6 weeks or 30 workdays

International students must confer with the Office of Global Services to determine CPT requirements as appropriate.

Course Numbering System

0001–0999

Orientation and basic

No degree credit

Undergraduate

1000–1999

Introductory level (first year)

Survey, foundation, and introductory courses, normally with no prerequisites and designed primarily for students with no prior background

2000–2999

Intermediate level (sophomore/junior year)

Normally designed for sophomores and above but in some cases open to freshman majors in the department

3000–3999

Upper-intermediate level (junior year)

Designed primarily as courses for juniors; prerequisites are normally required, and these courses are prerequisites for advanced courses

4000–4999

Advanced level (senior year)

Designed primarily for juniors and seniors; also includes specialized courses such as research, capstone, and thesis

Graduate

5000–5999

First-level graduate

Courses primarily for graduate students and qualified undergraduate students with permission

6000–6999

Second-level graduate

Generally for master's and clinical doctorate only

7000–7999

Third-level graduate

Master's- and doctoral-level courses; includes master's thesis

8000–8999

Clinical/research/readings

Includes comprehensive exam preparation

9000–9999

Doctoral research and dissertation

Course Substitutions

Students may request to substitute one course for another to fulfill the academic requirements of a program. If approved, the substituted course will replace the originally designated course to fulfill the program requirement.

For Programs in Massachusetts and California

Course substitution requests must be reviewed by the student's academic advisor in consultation with the director of the student's program and the department that offers the original course. Once approved, the academic advisor will process the substitution.

For Programs Outside Massachusetts and California

Students must submit a Request for Waiver of University-Wide Graduate Requirement (https://graduateeducation.sites.northeastern.edu/academics-wide/#admins_forms) to the Office of the Provost. Approved course substitutions are processed by the Office of the Provost, and the decision will be communicated to both the student and their academic advisor.

Course Withdrawal

Students who withdraw from a course after the add/drop deadline and before the last day to withdraw will receive a W grade on their academic history and transcript to indicate that they withdrew and did not complete the course. The withdrawal does not affect the calculation of the cumulative grade-point average, but it does impact a student's academic progression as counted toward attempted credit, which may result in the student being placed on academic probation or dismissal.

Students must withdraw from courses using the Student Hub.

Students who fail to withdraw from a course by the deadline, regardless of their level of class participation or attendance, are financially and academically responsible. A student's lack of academic engagement and completion of course requirements will likely result in a final grade of F.

All students are encouraged to consult with their academic advisor prior to withdrawing from a course to understand how that may affect their progress toward their degree. Withdrawals may impact a student's time to degree completion.

A reduction in a student's course load due to withdrawals affects a student's externally reported time status and may impact progress toward degree, academic standing, financial aid, scholarship or other entity that has time status requirements for eligibility, and/or international student enrollment requirements. A student considering a withdrawal should consult with the relevant office or entity before they submit requests for withdrawal to understand how it may affect their respective eligibility or status.

Grade Change Policy

If a student has not graduated, a grade can be changed by a course instructor within 12 months of the end of the semester in which the grade was given.

If a student has graduated, or if more than 12 months have elapsed, a grade can only be changed by request of a course instructor with the approval of the college that offers the course.

If more than 24 months have elapsed, grades can no longer be changed.

If a course instructor is not available, course change requests may be initiated by the department or college that offers the course.

Colleges may place additional restrictions on how grades can be changed.

The grade change policy explains when a course instructor may change a student's grade to correct errors. This policy does not apply to incomplete grades or to student-initiated appeals to change grades. In particular, the grade change policy should not be used to allow a student to submit work after the completion of a class.

Grade Table and GPA

Grade Table

Grades are officially recorded by letters, evaluated as follows:

Letter Grade	Numerical Equivalent	Explanation
A	4.000	Outstanding achievement
A–	3.667	
B+	3.333	
B	3.000	Good achievement
B–	2.667	
C+	2.333	
C	2.000	Satisfactory achievement
C–	1.667	
D+	1.333	Undergraduate only
D	1.000	Undergraduate only/Poor achievement
D–	0.667	Undergraduate only
F	0.000	Fail
I		Incomplete ¹
IP		In progress ^{1,2}
CR		Credit (School of Law only)
HH		High Honor (School of Law only)
H		Honor (School of Law only)
P		Pass (School of Law only)
MP		Marginal Pass (School of Law only)
NE		Not enrolled
NG		Grade not reported by faculty ³
S		Satisfactory (counts toward total degree requirements)
U		Unsatisfactory
X		Incomplete ¹
L		Audit (no credit given)
T		Transfer
W		Withdrawal (student-initiated withdrawal after the add/drop period and before the withdrawal deadline)
AD		Administrative Drop ⁴
AW		Administrative Withdrawal ⁵

¹ I, IP, or X shows that the student has not completed the course requirements.

² IP is intended for courses that extend over several terms. The time restrictions on the incomplete grade do not apply to the IP grade. While the IP grade is left unchanged, it is not included in computing the GPA. If the IP grade is never changed, the course does not count toward graduation requirements.

³ NG is intended for classes with temporary unreported grades. The Office of the University Registrar may enter an NG grade code after the grading deadline in accordance with the academic calendar if no grade is entered on the student's record during the instructor grading period. The instructor of record will subsequently resolve the grade to update the student record. See also *Grade Change Policy*.

⁴ AD is assigned by the university when a student is removed from a course after the add/drop period but the approved academic appeal indicates that the student should not have a W grade. AD carries no academic penalty or calculation toward the GPA. It indicates that enrollment was ended due to circumstances outside the normal student course drop process. Administrative Drops are not counted toward total attempted hours in the calculation of Satisfactory Academic Progress for financial aid. See the *Financial Aid* page of this catalog for more information.

⁵ AW is assigned by the university when a student is removed from a course for administrative, academic, or disciplinary reasons based on an approved academic appeal. AW carries no academic penalty or calculation toward the GPA. It indicates that enrollment was ended due to circumstances outside the normal student withdrawal process. Administrative Withdrawals are counted toward total attempted hours in the calculation of Satisfactory Academic Progress for financial aid. See the *Financial Aid* page of this catalog for more information.

Course Comments

The following notations may also appear on the student's transcript:

E	Course excluded from GPA
HON	Honors-level course
I	Course included in GPA

GPA

Numerical equivalents for scholastic averages are weighted according to the number of hours the course carries. For example, suppose a student receives a grade of B in a course carrying 4 semester hours and a grade of A in a course carrying 1 semester hour. The weightings for these example courses are as follows:

Grade	Numerical Equivalent	Semester Hours	Weight
B	3.000	4	12
A	4.000	1	4
Totals:		5	16

The GPA for both courses would then be the total weight (16) divided by the total semester hours (5), or 3.200. Grades of I, IP, S, U, and X are not included in the calculation of the GPA. See Grade Table (p. 115) for a complete list of grades and numerical equivalents.

SUBSTITUTING COURSES

In some cases, it may not be possible to retake a course if a student wishes to do so. In unusual circumstances, students may petition to substitute one course for another they have already taken, as long as the subject matter of both courses is substantially alike. With the approval of the student's academic advisor and the agreement of the department that offered the first course taken, a grade received in the new course will be labeled "Substitute" on the transcript and will be treated in the GPA calculation as a "retake" grade, as described at *Retaking Courses* in this catalog. The original grade will remain on the student's Northeastern University transcript. Students should consult with their academic advisor before enrolling in any proposed substitute course. Students are required to pay normal tuition charges for all substitute coursework.

Graduation Requirements

To be eligible to be awarded a degree, graduating students must meet all academic requirements, specific program of study requirements, residency requirements, and be in good standing. In addition, before receiving their diploma, students must also clear all financial, experiential education, and disciplinary deficiencies. Requirements are specified for each program under the various schools and colleges in this catalog.

Once matriculated, students are expected to complete all coursework for their degree at Northeastern University; at an entity in a formal contractual, consorial, or partnership relationship with Northeastern; or at an approved Northeastern study-abroad program. In some cases, to clear a deficiency, to permit students access to courses deemed by their respective advisors and colleges to be important for their education but unavailable to them at Northeastern, or to remain on track for graduation, a student may petition their college for permission to take a course at another accredited institution.

Prior to completion of their program, the student's university degree audit will be reviewed by their college's academic advising office.

Commencement

Attendance at Commencement is optional. Information concerning Commencement is provided to all graduating students during the spring semester. Students who have been removed from the graduation list are notified if they fail to qualify for their degrees. No special notice is sent to students who do qualify.

Graduation Procedures

The following information is for degree-seeking students only. Certificate students should refer to the "Certificate" section below.

Only students who complete the graduation application process by specified deadlines will be considered for graduation and included in the graduation ceremony program. All qualified students must submit a graduation application to receive their diploma, regardless of whether they plan to attend the graduation ceremony.

Note important definitions: "Degree conferral date" and "graduation ceremony date" are not the same. Degree conferral date refers to the date of Northeastern's official recognition of degree completion. For the purposes of the graduation application that is accessed via the Student Hub (<https://me.northeastern.edu>), the "expected graduation date" is the same as the degree conferral date. Northeastern confers degrees three times each academic year: at the end of the fall, spring, and summer terms. The graduation ceremony date is the date that the college hosts the annual graduation ceremony.

Each fall, the Office of the University Registrar sends an email notification to students who may be eligible to graduate that academic year about applying to graduate. Eligibility is based on the EGD. This email notification informs and instructs students to complete the "Apply to Graduate" process, accessed via the Student Hub. Students are prompted to verify and provide critical information, e.g., spelling of the student's name on the diploma and mailing address.

An accurate EGD is required to gain access to the graduation application. The EGD is also used by clearinghouses to determine loan deferment schedules. A student who needs to update their EGD should contact their academic advisor.

Diploma

Information that will be printed on diplomas includes:

- Degree.
- The major will be printed on diplomas for nonspecified degrees only: Associate in Science, Bachelor of Science, Bachelor of Arts, Master of Science, Master of Arts, Master of Professional Studies, Certificate of Advanced Graduate Study, Doctor of Philosophy). Minors and concentrations are not printed on diplomas.
- Honors designation, for those who qualify.

Changes made to a student's name after the diploma has been printed may be subject to a \$50 fee and take more than one month to reprint.

Changes made to a student's degree information and name submitted after the graduation ceremony program deadline will not be noted in the graduation ceremony program.

Certificate

Certificates are conferred at the same time degrees are conferred each year in fall, spring, and summer terms. Students must consult with their academic advisor to be admitted to the certificate program to receive their certificate. Deadlines apply. Students should contact their academic advisor for more information.

Academic Transcripts

Currently enrolled students may obtain unofficial transcripts and also order official transcripts from the Student Hub. For further information on transcript requests, visit the Registrar Service Portal (https://service.northeastern.edu/registrar/?id=kb_article_view&sysparm_article=KB000019947). All questions concerning transcript requests should be directed to 617.373.2300, TTY 617.373.5360.

Academic information noted on official academic transcripts includes degree/certificate name; major; minor (if applicable); academic history, including transfer credits; and graduation honors designation (if applicable).

Instructional Methods

The instructional method for all class sections must match the method indicated in the class schedule to satisfy university and regulatory requirements.

Traditional Instructional Method

- Classes must be conducted in person at a designated campus location.
- In circumstances in which a faculty member is unable to teach a class session in person, the faculty member may teach a class online, but total online instructional time may not exceed 10% of required instructional time during the semester.
- Students are ordinarily expected to attend classes in person. Additional online class meetings may be available to a student with a Disability Access Services accommodation (<https://disabilityaccessservices.northeastern.edu/>).

Hybrid Instructional Method

- The majority of class hours (minutes) must be conducted in person at a designated campus location; however, some classes are held online (asynchronous and/or synchronous).
- When a faculty member is unable to teach an in-person class in person, classes must be rescheduled in person.
- Additional online class meetings may be available to a student with a DAS accommodation.

Live Cast Instructional Method

- Classes must be conducted in person at a designated campus location; students enrolled in this method are receiving in-class instruction synchronously with an instructional assistant physically present in their campus location.
- When a faculty member is unable to teach a class session, classes must be replaced by another in-person meeting.
- Online class meetings for sections taught in this instructional method may be available to a student with a DAS accommodation.

Online Instructional Method

- Classes must be conducted online (asynchronously or synchronously).

Colleges may have more restrictive policies on class section instructional methods.

Students who are unable to attend classes in person for extended periods should be advised to consider a leave of absence.

Leaves of Absence and University Withdrawal

Students may request to take the following types of leaves of absence:

- Personal or Academic
- Medical or Emergency
- Military Deployment or Missionary Service

Students in prematriculation programs, such as Pathway programs (including Global Pathways, Foundation Year, NU Immerse), and Global First Year programs (N.U.in, Global Scholars, London Scholars), do not fall under the leave of absence policy below. Students in these programs with emergent, medical, or personal circumstances that require a conversation about their ability to continue with their program of study should reach out to We Care (<https://we-care.studentlife.northeastern.edu/>) for further guidance.

General Leave of Absence Policy

Students who wish to take a leave of absence should complete a request through the Student Hub (<https://me.northeastern.edu>) (or via University Health and Counseling Services for a medical leave of absence, as described below) before the last day to drop without a W in a term. Please consult the Academic Calendar (<https://registrar.northeastern.edu/group/calendar/>) for the last day to drop without a W in the term.

Students can request a leave until the last day to drop with a W in a term but should review the financial implications of withdrawing from courses on the Student Financial Services website (<https://studentfinance.northeastern.edu/policies-procedures/withdrawalleave-of-absence/>).

Students can take up to one year of leave.

Any leave of absence type, if approved, is subject to the following conditions:

- International students must make an appointment with the Office of Global Services (<https://international.northeastern.edu/ogs/>) to discuss leave of absence procedures in accordance with federal regulations.
- Students who do not return at the end of the leave will be withdrawn and must contact their college for reentry prior to the term start.
- Students must return to a Northeastern University-sponsored activity that contributes toward the satisfaction of outstanding program requirements, such as registration for academic coursework.
- Students must be considered active in the period for which they are requesting a leave. Students are considered active when they are currently engaged in university-sponsored activity, such as academic coursework and co-op. If a student is withdrawn for personal reasons, the withdrawal can be reversed and a request for a leave of absence can only be processed if it is before the last day to drop without a W in a term. If the student has been administratively withdrawn, a request for leave of absence cannot be considered until the withdrawal is resolved.
- If a leave extends more than six months, students who have taken loans for education expenses may be required to begin repayment of those loans. Students who receive financial aid should meet with a financial aid counselor before going on a leave. Please see the Financial Aid section of this catalog for the possible financial aid impact of a leave of absence.
- Students in university housing should refer to the Office of Housing and Residential Life for policy information.
- A student's enrollment status cannot include more than one academic year of consecutive nonclass enrollments. Students on leave for more than one year will be withdrawn from the university.
- If a student has taken multiple leaves, resulting in the postponement of expected graduation date of a calendar year, the next leave request will be processed as a withdrawal.
- While on leave, students are not allowed to take classes for credit toward their Northeastern degree, either at Northeastern or at an outside institution.
- While on leave, students are not allowed to participate in any university-affiliated activities.

Students on a leave of absence are considered active students and are able to register for classes in an upcoming term in a leave status. If a student is unable to register because they are inactive, the student should contact their college for reentry at the time of registration for the return term. Students are expected to register for classes upon returning from a leave of absence.

LEAVE OF ABSENCE FOR INTERNATIONAL STUDENTS

International students must discuss maintenance of U.S. immigration status with an advisor at OGS before requesting any type of leave of absence.

PERSONAL OR ACADEMIC LEAVE OF ABSENCE

Personal leaves of absence are general leaves of absence that do not meet the criteria of more specific leaves outlined in the catalog. Academic leaves are applied to a student record in the rare cases when a student has fulfilled the last remaining requirements abroad but final grades have been yet to be received at Northeastern; or are taking a leave of absence from Northeastern to pursue other academic work. A student interested in requesting a personal or academic leave of absence should speak with an academic advisor.

MEDICAL OR EMERGENCY LEAVE OF ABSENCE

Medical leave is an option available to those Northeastern students who develop a major medical condition that precludes class attendance, completion of requirements, and/or participation in co-op. Medical leave of absence requests must be initiated at UHCS (<https://uhcs.northeastern.edu/forms/medical-leave-of-absence/>).

Students on a medical leave will no longer have Husky Card access to the Marino Center, libraries, dining services, residence halls, and UHCS. If a student is in treatment at UHCS, they will be provided with referral resources for care in the community where they will reside during their medical leave. Students are not to be participating in student groups while on medical leave.

Emergency leaves may be granted when a student cannot continue attending class after the start of the term due to life-changing situations beyond the student's control. Students interested in requesting emergency leave are encouraged to contact We Care (<https://we-care.studentlife.northeastern.edu/>). Students can request an emergency leave of absence via the Student Hub (<https://me.northeastern.edu>).

Students who have been granted a medical or emergency leave of absence due to extenuating circumstances may submit a Leave of Absence Refund Appeal form (https://service.northeastern.edu/sfs/?id=sc_cat_item&sys_id=50dc23cddb464150ebcdcafc13961951&sysparm_category=98921886db600d54ca10819b1396197e) for financial consideration. If the appeal is approved, please note that housing charges, meal plans, and other fees will not be included in the appeal decision; refer to the Residence Hall and Dining License Agreement (<https://housing.northeastern.edu/license-agreement/>). Please only complete the Leave of Absence Refund Appeal form if you have been approved for a medical or emergency leave of absence.

Please note that any outstanding balance (including unpaid balances) for the academic term in which the leave is taken are still due to the university.

Financial aid recipients must contact their financial aid counselor to understand the effects on aid received.

If the leave extends more than six months, students who have taken loans for education expenses may be required to start repayment of those loans.

Students enrolled in the Northeastern University Student Health Plan will remain enrolled in the plan for the plan year, ending August 31.

LEAVE OF ABSENCE DUE TO MILITARY DEPLOYMENT OR MISSIONARY SERVICE

When a student is called to active duty or missionary service, they must request the leave by filling out the proper request form through the Student Hub (<https://me.northeastern.edu>). Proof of official deployment or call to service paperwork will be required as an attachment when filling out the leave of absence request.

When a student is called during the term, the university will:

- Excuse tuition for that term. Any payment made will be credited to the student's account.
- Post a leave of absence for the term to hold a place for the student when they return.

If a student is called near the end of the term, the student and faculty members may determine that incomplete (I) grades are more appropriate. In this case, tuition will not be waived.

When a student returns to the university after completion, they will notify the college academic student services office if the leave was longer than one year; that office will in turn notify the Office of the University Registrar. The college academic student services office will assist the student with reentry and registration. If the leave was less than one year, the student should register for classes for the upcoming term prior to returning to campus.

International students who must take a leave of absence to engage in military service in their home country must also complete a form for leave of absence with OGS.

RETURNING FROM A LEAVE OF ABSENCE

Students on a leave of absence are considered active students and are able to register for classes in an upcoming term in a leave status. If a student is unable to register because they are inactive, they should contact their college for reentry at the time of registration for the return term. Students are expected to register for classes upon returning from a leave of absence.

Students who are withdrawn and are applying for Commencement may be reentered on a leave of absence, pending the college's approval, prior to the term in which they will graduate. International students returning from a leave of absence should contact OGS regarding the Student and Exchange Visitor Information System procedures three to four months prior to anticipated return date.

Students who wish to reenter the university following a medical leave must contact UHCS. Reentry from a medical leave requires receipt of all documentation delivered to UHCS approximately one month prior to the start of the term they wish to return. Once all documentation is received by UHCS, it will be reviewed and the student will be notified of the decision. Requests for reentry from medical leave must be completed no later than one week prior to the beginning of a term. Students must be enrolled in Northeastern classes for the term in which they wish to return from their medical leave of absence. More specific information about the reentry process can be found at the UHCS website (<https://uhcs.northeastern.edu/forms/medical-leave-of-absence/>).

University Withdrawal

Students seeking to withdraw from the university for any reason should meet with their academic advisor before completing the university withdrawal form online. Students should review the financial implications of withdrawing from all classes on the Student Financial Services website.

Students may be withdrawn from the university for financial, disciplinary, or academic reasons. Students looking to withdraw for medical reasons should reach out to UHCS (<https://uhcs.northeastern.edu/about-uhcs/contact-us/>) to review medical leave of absence.

Personal Information

Change of Name

Report all name changes to the Office of the University Registrar immediately by submitting a Personal Details Update ServiceNow (https://service.northeastern.edu/registrar/?id=sc_cat_item&sys_id=76dd3a7c973f25d0beddb4221153afec&sysparm_category=07325e0197487110beddb4221153afb7) ticket. Official documentation of the name change is required. International students must also report all name changes to the Office of Global Services.

Change of Address

Report all address changes via the Student Hub (<https://me.northeastern.edu>). Both the permanent home address and the local address are required. International students must report any changes of local address or phone number via the Student Hub (<https://me.northeastern.edu>) within 10 days in order to comply with immigration regulations.

Requesting and Clearing An Incomplete Grade

An incomplete grade may be reported by the instructor when a student has failed to complete a major component of a required course, such as homework, a quiz or final examination, a term paper, or a laboratory project. Students may make up an incomplete grade by satisfying the requirements of the instructor or, if the instructor is absent, the chair of the department. Be aware that instructors' policies on the granting of incomplete grades may vary and that the final decision on an incomplete grade is up to the instructor. Instructors may deny requests for an incomplete grade.

To request an incomplete grade, the student must obtain and complete in consultation with the instructor an Incomplete-Grade Contract (<https://registrar.northeastern.edu/article/incomplete-grade-contract/>) on which the precise agreement for clearing an incomplete grade is specified. The contract is then signed by the student, the instructor, and the student's academic advisor. Copies of the form are kept by the student, the instructor, and uploaded to the student's advising notes. The maximum time period for clearing an incomplete grade is restricted to 30 days from the end of the term in which the course was offered. Instructors may require a shorter due date before approving incomplete grade requests.

International students should consult with the Office of Global Services before requesting an incomplete grade to ensure that they will remain in compliance.

If the missing assignment(s) have not been submitted to the instructor within 30 days from the end of the term in which the course was offered, or the agreed upon due date, the grade entered will reflect the student's grade in the course for the work completed and the missing assignments receiving no credit toward the final grade. Changes in the final grade will be applied to the term in which the student was enrolled in the course. Any exception to this policy or extension of the deadline must be recommended by the college in which the course was offered and must be forwarded in writing to the Office of the University Registrar for implementation.

Retaking Courses

When the appropriate course is available, students may retake a nonrepeatable course to earn a better grade. In all cases, the most recent grade earned in a course is the one used in calculating the overall grade-point average followed by the retake notation I, indicating the course grade is included in the overall GPA; however, previous grades remain on the transcript followed by the retake notation of E, signifying that that course grade has been excluded. Consult your academic advisor before retaking a course. Students are required to pay normal tuition for all retaken coursework.

When the course description for the student's registration term indicates that the course may be repeated up to a certain number of course completions, each completion of the course (up to the limit stated in the course description) will appear on the student's transcript, and the grade for each such completion will be used in the calculation of the student's overall GPA.

Student Bill of Academic Rights and Responsibilities

This bill was drafted by the Student Senate, the Senior Vice Chancellor for Student Life, and members of the Faculty Senate. It was passed in the spring of 1992. It was then updated by the Student Body President and Vice President for Academic Affairs, and passed by the Student Senate in the Fall of 2017 and Faculty Senate in the Spring of 2018 for adoption in the Student Handbook (<https://catalog.northeastern.edu/handbook/>) for the 2018–2019 academic year.

We, the students of Northeastern University, believe that a quality education is the paramount goal of all students. In order to fulfill this goal, the university recognizes certain rights and responsibilities, which follow below.¹ Northeastern University students recognize and accept that redress of complaints arising from these rights is limited to the procedures specified in *Academic Appeals Policies and Procedures*.²

Course-Related Rights

ARTICLE 1

Students have the right to instructors who attend classes on time.

ARTICLE 2

Students have the right to receive grades and feedback in a timely manner, particularly in the case of sequentially related assignments. At least one summative assessment should be given and returned a week prior to the end of the withdrawal period. Students also have the right to view work they submit to satisfy course requirements after it is graded and receive their instructor's rationale for grades received on said work.

ARTICLE 3

Students have the right to adequate access to instructors. This includes instructors replying to communications from students in a timely manner, suggested to be within two business days, with the exception of during university recesses, as well as maintaining consistent office hours for in-person courses, occurring at the same time at least once a week. Instructors may change office hours by notifying students in a timely manner, suggested to be within two business days, barring extenuating circumstances.

ARTICLE 4

Students have the right to receive a course outline, which includes a fair and explicit grading policy, at the beginning of each course. Changes to the course outline that result in a deadline, assignment, major exam, or similar course event being introduced to or moved earlier in the schedule shall be communicated to students in a timely manner, suggested to be at least 10 business days prior to the new deadline.

ARTICLE 5

Students have the right to instructors who communicate the material pertaining to the course effectively in the English language except in the case of foreign language instruction.

ARTICLE 6

Students have the right to participate in and have access to Student Government Association teacher/course evaluations.

ARTICLE 7

Students have the right to have a list of all course materials that must be purchased. Possible substitutions for said course materials (e.g., acceptable previous editions of textbooks, digital versions, library-owned resources) should be made available to students at least a week prior to the start of the academic term.

ARTICLE 8

Students have the right to alternative grading arrangements if they are unable to attend a graded activity that takes place outside the scheduled class time.

Rights to University Academic Services

ARTICLE 9

Students have the right to adequate access to effective academic services, including academic and co-op advising, as described in the student handbook and other university publications, provided by the university.

ARTICLE 10

Students have the right³ to an environment conducive to learning and to faculty who respect students' academic freedom⁴ in the classroom. When exercising academic freedom, students are expected to comply with all applicable university ethics, anti-harassment, and nondiscrimination policies.

ARTICLE 11

Students have the right to access university health resources provided by University Health and Counseling Services (<https://uhcs.northeastern.edu/>) (UHCS), and in accordance to Massachusetts State Law, to have access to a medical plan that they can purchase (Northeastern University Student Health Plan (<https://studenthealthplan.northeastern.edu/>)).

ARTICLE 12

Students have the right to access university resources provided by the university's Disability Access Services in accordance with the Policy on Nondiscrimination and Equal Opportunity (<https://policies.northeastern.edu/policy107/>). Students have the right to pursue informal and formal grievances through the procedures outlined by Disability Access Services (<https://drc.sites.northeastern.edu/>).

Scheduling Rights**ARTICLE 13**

Students have the right to final exam schedules in accordance with established university policy, including non-conflicting final exam schedules.

ARTICLE 14

Students have the right to attend any course session held prior to the end of the add/drop period so long as permission from the instructor is obtained in advance and all duly registered students have proper access to seating and other course resources.

ARTICLE 15

Students will not be penalized for excused absences, with the understanding that students may need to make up for the academic commitment from which they were excused. Reasons for an excused absence include religious, medical issues, jury duty, bereavement, and military service. See this catalog (<https://catalog.northeastern.edu/undergraduate/academic-policies-procedures/attendance-requirements/>) and other applicable policies (http://gonu.com/sports/2013/7/15/SASS_0715134535.aspx?path=sass) for the full attendance and excusal policy.

General Academic Rights**ARTICLE 16**

Students have the right to be informed, in a timely fashion, of proposed action to be taken against them.

ARTICLE 17

Students have the right to the redress of academic grievances through the processes provided by the university.

ARTICLE 18

Students have the right to university support and resources, such as the Office of Global Services (<https://international.northeastern.edu/ogs/>), with regard to their visa status.

ARTICLE 19

In accordance with the university's Policy on Nondiscrimination and Equal Opportunity (<https://policies.northeastern.edu/policy107/>), students have the right to a learning environment free of discrimination or harassment, including as provided for in the university's Policy on Sexual and Gender-Based Harassment and Title IX (<https://policies.northeastern.edu/policy104/>).

ARTICLE 20

Northeastern University's policies on student-produced intellectual property can be found in the Policy on Copyright (<https://policies.northeastern.edu/policy206-USA/>) and Policy on Patents (<https://policies.northeastern.edu/policy207-USA/>).

ARTICLE 21

Students have the right of access to their academic and financial aid records and maintenance of the privacy of these records, as provided by applicable privacy laws.

Student Responsibilities**ARTICLE 1**

Contribute to a climate of open inquiry and honesty in all aspects of the university's academic life. This includes reviewing, and becoming familiar with, the university's Academic Integrity Policy (p. 88).

ARTICLE 2

Commit sufficient time and effort for study and for use of library, studio, laboratory, and computational facilities, as appropriate for each course.

ARTICLE 3

Contribute to the classroom/laboratory/studio learning environment through discussion and active participation.

ARTICLE 4

Acquire the necessary prerequisites for full participation in each academic course.

ARTICLE 5

Attend scheduled classes regularly and on time, and arrive to class prepared, having completed all the readings and other assignments.

ARTICLE 6

Seek out faculty and teaching assistants outside of class time, to obtain help with problems encountered in a given course.

ARTICLE 7

Respect the academic freedom⁴ of each faculty member and student.

ARTICLE 8

Assist the university in its various self-evaluations (e.g., TRACE, surveys) by responding honestly and conscientiously.

ARTICLE 9

Maintain effective communication with the university by providing permanent and local address information to the university through a system designated by the university, and by reading university email on a frequent and consistent basis.

ARTICLE 10

Act as positive representatives and genuine ambassadors of the university when studying and working in domestic and international settings associated with Northeastern University.

ARTICLE 11

Complete an entry (including itinerary, accommodation information, and contact information) using "My Travel Plans," located via the Student Hub (<https://me.northeastern.edu>) or other system as required by the university, prior to all university-sponsored travel including, but not limited to, Study Abroad; Dialogues of Civilization; exchange programs such as BSIB, Alternative Spring Break, Engineers without Borders, co-op placements, etc.

ARTICLE 12

Complete all required activities prior to attending classes for their entrance date (including alcohol education, violence prevention programming, required reading, etc.).

ARTICLE 13

Have in their possession at all times the officially approved and properly validated photo identification card.

Students who fail to comply with these responsibilities could lose certain student privileges as well as face possible disciplinary sanctions under the Code of Student Conduct (p. 96).

- ¹ The student rights, through their representatives in the Student Government Association (SGA), described in these sections arise from faculty and staff employment responsibilities and obligations to the university. Northeastern University students recognize and accept that it is the sole prerogative of the university to enforce these obligations and responsibilities and to determine whether and to what extent they are being carried out or violated in specific instances. Northeastern University students recognize and accept that their ability to effect redress of complaints arising from these rights is limited to the procedures specified in the current Student Handbook.
- ² The articles shall be interpreted by the Office of the Provost in conjunction with the Office of the Vice Chancellor for Student Life, and shall be monitored by the Student Government Association. Further, should any student discover that they have been subject to any violation of the principles stated herein, the student should follow the appropriate complaint resolution procedure in the Student Handbook. The Student Government Association, if requested by the student, will monitor the progress of any student academic grievances.
- ³ Because the university operates on a 12-month calendar in an urban environment, many construction, remodeling, renovation, and repair projects must take place while the university is in session, and other potential distractions from the learning process arise from the surrounding urban environment on which it is dependent but over which it exerts little or no control. Thus, though the university is committed to maintaining an appropriate learning environment for its students, Northeastern University students recognize and accept, as part of their relationship with the university, that the conditions described above may cause occasional disturbances to that environment.
- ⁴ For more on academic freedom, please refer to the AAUP's definition (<https://www.aaup.org/report/1940-statement-principles-academic-freedom-and-tenure/>).

Student Records Privacy

Student Privacy—General Information

Students have specific privacy rights under applicable laws that vary depending on the global jurisdictions in which they reside. A general statement of student privacy rights is set forth in Northeastern University's Privacy Information (<https://www.northeastern.edu/privacy-information/>) site.

As a general matter, students have the right to:

- Access to their education records
- Seek to have their records amended (see the Registrar Service Portal (<https://service.northeastern.edu/registrar/>) for this procedure)
- Exercise some control over the disclosure of information from their records, including to parents and guardians

Additional information regarding these rights is provided below. Please note that these rights are subject to some exceptions under applicable laws. For a full statement of student privacy rights, please refer to the privacy policy referenced above.

Family Disclosure

Students have a right to privacy in their education records, which extends to preventing access by family members. While this right is subject to some exceptions under applicable laws, unless you indicate otherwise, Northeastern will inform parents or guardians, if asked, that access to your records is restricted and they should consult with you if they would like to see your records.

Release of Directory Information

For certain specific administrative purposes (such as confirming your attendance at Northeastern to employers and loan agencies or publicizing information about you if you are on an athletic team), Northeastern would like to release limited student data that it has designated as "directory information." You are given a choice whether or not you agree to this during the registration process. You may change your selection at any time on the university Student Hub or by notifying the university in writing by opening a case in the Registrar Service Portal (<https://service.northeastern.edu/registrar/>).

Directory information is defined in the university's Policy on Student Rights Under the Family Educational Rights and Privacy Act (FERPA) (<https://policies.northeastern.edu/policy106/>) as the following:

- Student name
- Home address (city, state, country only)
- Major field of study
- College
- Class year
- Enrollment status (e.g., undergraduate or graduate, full time or part time)
- Dates of attendance
- Degrees, honors, and awards received
- Most recent educational agency or institution attended
- Sports activity participation, showing weight/height of members of athletic teams
- Participation in officially recognized activities

How to Exercise Privacy Rights

Subject to certain exceptions, privacy laws afford students certain rights with respect to their education records. These rights are:

1. The right to inspect and review the student's education records within 45 days of the day the university receives a request for access (or fewer days if provided by applicable law). Students should submit to the registrar, dean, or head of the academic department (or appropriate official) written requests that identify the record(s) they wish to inspect. The university official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the university official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.
2. The right to request the amendment of the student's education record that the student believes is inaccurate or misleading. Students may ask the university to amend a record that they believe is inaccurate or misleading. They should write the university official responsible for the record, clearly identify the part of the record they want changed, and specify why it is inaccurate or misleading. If the university decides not to amend the record as requested by the student, the university will notify the student of the decision and advise the student of their right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.
3. The right to provide written consent before the university discloses personally identifiable information from the student's education records. There are a number of exceptions to this right, such as disclosure to school officials (including service providers working on the university's behalf) with legitimate educational interests or disclosures to entities involved in financial aid responsibility.
4. The right to file a complaint with the applicable regulatory agency for alleged failures by the university to comply with privacy law. In the United States, that is the U.S. Department of Education; in Canada, the Privacy Commissioner of British Columbia or Toronto (as applicable) or of Canada;

and in the United Kingdom, it is the Information Commissioner's Office. At Northeastern, you may write to the Office of the University Registrar, 271 Huntington Avenue, Boston, MA 02115, or contact privacy@northeastern.edu.

Additional Information

Additional information can be obtained from the university's chief privacy officer at privacy@northeastern.edu.

Student Responsibility Statement

By accepting responsibility for their education, students enhance the development of their academic, social, and career goals. As a condition of enrollment, students are responsible for reviewing, understanding, and abiding by the university's policies, regulations, procedures, requirements, and deadlines as described in all official publications, including the university's Academic Catalog, Northeastern and college websites, and official university email communications, as applicable.

Students are responsible for meeting the degree requirements of their academic programs in all respects, including completeness and correctness of course selection, compliance with prerequisite and corequisite requirements, completion of program and degree requirements through regular, comprehensive review and understanding of the degree audit, and observance of all academic regulations and deadlines.

Students are expected to seek guidance from appropriate university representatives, such as departmental program advisors, academic advisors, co-op coordinators, and the Office of the University Registrar (<https://registrar.northeastern.edu/>), to confirm their compliance with all applicable academic expectations and requirements.

Student Right-to-Know Act

For disclosures required by the U.S. Student Right-To-Know and Campus Security Act, visit University Decision Support (<https://uds.northeastern.edu/about/consumer-information/>).

Student Time Status

Student Time Status

Student Time Status refers to the classification of students based on the number of credit hours they are enrolled in during a given semester or academic term. It helps to categorize students into full-time or part-time status, which is important for academic planning and standing, financial aid eligibility, and institutional reporting. The classification also assists in determining the level of student engagement and the support services needed to ensure student success.

Time status is determined on the census date of each academic term, and any changes to a student's enrollment after this date may affect their status.

F-1 and J-1 international students have specific requirements for full-time enrollment, which is based on the student's nonimmigrant status in the U.S. International students who have questions about taking a reduced course load or taking classes online should seek advice directly from the Office of Global Services (<https://international.northeastern.edu/ogs/>).

Course Load

Federal financial aid recipients must be enrolled in and successfully complete a minimum number of credits each semester to maintain eligibility. For more information, contact your financial aid counselor.

Time Status Categories

The following table outlines the time status classifications based on the number of credit hours a student is enrolled in during an academic term. The credit hours are listed to the tenth decimal for more precise classification:

UNDERGRADUATE SEMESTER HOURS

Time Status Classification	Credit Hours
Full time	12.00 or greater
Three-quarter time	9.00 - 11.99
Half-time	6.00 - 8.99
Less than half-time	0.00 - 5.99

GRADUATE SEMESTER HOURS

Time Status Classification	Credit Hours
Full time ^{1,2}	8.00 or greater
Three-quarter time	6.00 - 7.99
Half-time	4.00 - 5.99
Less than half-time	0.00 - 3.99

¹ Students who hold stipended graduate assistantships will be considered full time if enrolled for a minimum of 6 semester hours of credit.

² Students enrolled in Dissertation or Dissertation Continuation are considered full time.

COLLEGE OF PROFESSIONAL STUDIES UNDERGRADUATE SEMESTER HOURS

Time Status Classification	Credit Hours
Full time	12.00 or greater
Three-quarter time	9.00 - 11.99
Half-time	6.00 - 8.99
Less than half-time	0.00 - 5.99

COLLEGE OF PROFESSIONAL STUDIES GRADUATE QUARTER HOURS

Time Status Classification	Credit Hours
Full time	8.00 or greater
Three-quarter time	6.00 - 7.99
Half-time	4.00 - 5.99
Less than half-time	0.00 - 3.99

LAW SEMESTER HOURS

Time Status Classification	Credit Hours
Full time	11.00 or greater
Three-quarter time	8.50 - 10.99

Half-time	6.00 - 8.49
Less than half-time	0.00 - 5.99

Program-Specific Exceptions

Certain academic programs may define full-time enrollment differently due to their unique structure, accreditation requirements, or delivery format. Examples include, but are not limited to:

- Cohort-based or accelerated programs
- Professional or clinical programs with non-credit-bearing components (e.g., clinical placements)
- Thesis or dissertation research stages
- Summer term enrollment in structured year-round programs

Students enrolled in these programs may be considered full time based on program-specific criteria, which may differ from the standard credit-hour minimums.

Program-specific definitions of full-time status are published in the program requirements and plan of study sections of academic programs in this catalog.

Students should consult their academic advisors and program's plan of study for guidance.

University-Sponsored Travel

Northeastern University is committed to the health, safety, and security of its students and all other members of the university community. As a global institution, our university members undertake university travel around the world in pursuit of teaching, research, consulting, service, cocurricular activities, and work intended to advance learning and the interests of the university. The university supports standards and expectations associated with travel that are designed to reduce personal and university risk.

To enhance the health and safety of our students, you are required to comply with the university travel policies and guidance when undertaking university travel. These include, but are not limited to:

- **Registering University Travel**—Students, faculty, and staff are required to enter their travel itineraries per the Policy on Requiring Registration of University Travel (<https://policies.northeastern.edu/policy612/>). To access the registry, go to the Student Hub (<https://me.northeastern.edu/>) and navigate to My Travel Plans to register your travel. More information can be found on the Travel Registry page of the Global Safety and Support website (<https://globalsafety.northeastern.edu/travel-registry/>).
- **Review Destination Risks and Take Steps to Reduce Risks Before and During Travel**—Review the country briefing for your destination found in the My Travel Plans section of the Student Hub (<https://me.northeastern.edu/>) and travel health and safety advice issued by the U.S. Department of State (<https://travel.state.gov/content/travel/en/traveladvisories/traveladvisories.html/>), the U.S. Centers for Disease Control and Prevention (<https://wwwnc.cdc.gov/travel/notices/>), the UK Foreign Commonwealth & Development Office (<https://www.gov.uk/foreign-travel-advice/>), Government of Canada Travel Advisories (<https://travel.gc.ca/travelling/advisories/>) and other government organizations, the host nation, international organizations, etc. Travelers will be reminded about these sources via an email following trip registration.
- **Connectivity**—All students traveling on university programs must carry a cellphone with international calling, SMS, and cellular data capabilities per the Connectivity Requirements (<https://globalsafety.northeastern.edu/connectivity-requirements/>). Phones must be able to receive incoming and make outgoing phone calls without relying solely on data-calling or a Wi-Fi signal. Phone number must be updated in the Student Hub (<https://me.northeastern.edu/>) "I am Here" profile before travel or upon securing a new phone number on arrival.
- **Complete Travel Petitions or Waivers**—Visit the Travel Protocols page (<https://globalsafety.northeastern.edu/travel-protocols/>) to determine what forms travelers are required to complete before participating in off-campus programming. The page also explains how to obtain approval to travel to a destination designated as high risk by the university.
- **Reduce Your Travel Cyber Risk and Exposure**—Review and comply with the Policy on Computers and Mobile Devices for Travel to Destinations with Heightened Cybersecurity Risk (<https://policies.northeastern.edu/policy701/>) and review the information on the High Cyber Risk Destinations page on the Global Safety and Support website (<https://globalsafety.northeastern.edu/2020/11/10/high-cyber-risk-destinations/>).
- **Personal Health Insurance**—All travelers are required to have personal health insurance that provides coverage while participating on university trips. Insurance requirements and an explanation of the university-provided urgent and emergency program can be viewed on the insurance and global safety support network pages of the university's Global Safety and Support (<https://globalsafety.northeastern.edu/>) website.
- **Attend Predeparture Orientation**—PDO provides travelers with information about resources, requirements, safety, and security while traveling. Contact your program office to enroll in an in-person or online training.
- **Register Personal Travel**—Side trips are travel that takes place prior to, during the course of, and/or immediately following a scheduled program but is not part of the program. Travelers are required to notify the university and register side trips. Review the Side Trip Guidance (<https://globalsafety.northeastern.edu/2020/11/03/side-trip-guidance/>) for more information about your program's side trip registration requirements.
- **Student Housing Guidelines**—Students traveling abroad individually may be responsible for selecting and arranging their own housing. Please review the Student Housing Guidelines (<https://globalsafety.northeastern.edu/2020/10/14/student-housing-guidelines/>) on the Global Safety and Support website prior to booking accommodations.
- **Consult with the Office of Global Services**—International students participating on university programs outside of the home campus country should discuss any requirements with OGS (<https://international.northeastern.edu/ogs/>) prior to university.

Students are responsible for familiarizing themselves with the university travel policies and are encouraged to visit the university's Global Safety and Support (<https://globalsafety.northeastern.edu/>) website for guidance. If you have questions related to travel or travel support, please email mytravelplans@northeastern.edu. If you need assistance during university travel, please call the university's 24-hour travel assistance line at +1.857.214.5332 or tel:+44.20.3467.1773.

Academic Appeals Policies and Procedures

Academic appeals are submitted when a student disagrees with an academic determination, such as a change in academic status or a grade in a class. Students who would like to submit an academic appeal should complete the steps listed below.

Students who have other academic concerns should submit an academic complaint.

Students may find the following resources useful. More information about these resources is below.

- Office for University Equity and Compliance (<https://ouec.northeastern.edu>)
- Office of Student Conduct and Conflict Resolution (<https://osccr.sites.northeastern.edu>)
- We Care (<https://we-care.studentlife.northeastern.edu>)
- Graduate Ombuds (<https://graduateombuds.northeastern.edu>)
- Northeastern University Anonymous Reporting Hotline (<https://compliance.northeastern.edu/anonymous-reporting-hotline/>)

Academic Appeal Process

Introduction

Northeastern University is committed to ensuring that all graduate students are evaluated fairly concerning their academic performance, standing, and progress. The university presumes that its faculty's academic judgments are fair and objective. Any substitution of a different judgment for that of the original evaluator is a serious intrusion upon academic prerogatives entrusted to the faculty and others involved in academic evaluations.

Students who believe they have been erroneously, capriciously, inappropriately, or otherwise unfairly treated in an academic determination may submit an academic appeal. This includes claims of misinterpretation or inequitable application of any academic provision in the Graduate Catalog or Faculty Handbook.

All appeals should be initiated and resolved in a timely manner in accordance with the detailed time limits provided in this policy. Although students are entitled to seek the advice of outside legal counsel, students may not be represented by a lawyer in the informal or formal academic appeal procedures. A student may consult with the provost or the provost's designee at any point in this procedure for advice or assistance.

It is strongly recommended that U.S.-based F-1/J-1 international students and Canadian-based international students holding a study permit consult as soon as possible with the Office of Global Services (<https://international.northeastern.edu/ogs/>) to determine the possibility of any repercussion that the timing of an appeal may have on their immigration status.

Scope

Academic appeals are submitted when a student disagrees with an academic determination, such as a change in academic status or a grade in a class. Decisions concerning admission or readmission into a program, including dismissals, and matters related to co-op employment (other than grades received) cannot be appealed beyond the college level. While program dismissals cannot be appealed beyond the college level, underlying academic judgments that led to a dismissal can be appealed.

Scientific or research misconduct is defined as fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the academic and scientific community for proposing, conducting, or reporting research and does not include honest error or honest differences in interpretation or judgments of data. (Further information can be obtained from the U.S. Office of Research Integrity, Department of Health and Human Services.) Possible incidences of misconduct are to be reported immediately to the provost or their designee, who will initiate the appropriate procedures. Findings of scientific or research misconduct cannot be appealed through the process above.

If a student feels that they have been the victim of harassment or of discrimination prohibited by law or by university policy, and that this constitutes a substantive basis for the appeal, the appeal shall first be pursued and investigated through the Office for University Equity and Compliance (<https://ouec.northeastern.edu/>). In such cases, the appeal described in Step 3 below is submitted to the appropriate college and a copy provided to the OUEC. Following a resolution of the harassment/discrimination issues, any remaining academic issues will be addressed, at the request of the student, according to the academic appeals procedures described herein.

Appeal of Final Grades and Outcomes of Other Academic Evaluative Processes

STEP 1: DISCUSS WITH FACULTY MEMBER

Students are encouraged to discuss their concerns with the faculty member who made the academic determination. This step should occur as soon as possible after the academic determination, given the time limit on college-level appeals described in Step 4. If a student is not comfortable discussing the matter with the faculty member, the student should proceed to Step 2.

STEP 2: DISCUSS WITH PROGRAM OR DEPARTMENT ADMINISTRATOR

If the student wishes to appeal the decision of the faculty member, or if the student is not comfortable discussing the issue with the instructor or other faculty member(s) involved, the student has the option of requesting a meeting with the appropriate administrator (e.g., program director, department chair, or group leader) to further discuss their concerns. This step should occur as soon as possible after the academic determination, given the time limit on college-level appeals described in Step 4. If students need assistance identifying an appropriate program or department administrator, they should ask the college contact listed in Step 4 to identify the appropriate person.

STEP 3: PREPARE APPEAL STATEMENT

If the student wishes to appeal the decision of the program or department administrator, or if the situation precludes a student from pursuing these steps, the student should prepare a written statement. The statement must start with a clear description of the basis for the appeal and should include basic facts about the situation leading to the appeal, when the situation occurred, who was involved, and the resolution sought by the student.

All relevant supporting materials should be attached as addenda to the statement. Statements should avoid unsubstantiated, defamatory, or ad hominem accusations regarding the motivations of the faculty member or other persons involved in making the academic determination.

The statement and supporting materials will serve as the basis of the appeal throughout the appeals process, including at the university level.

The statement must be submitted no later than 28 days from the day when the academic determination was made available to the student. If a student wishes to dispute a grade in their final term, the statement must be submitted within 28 calendar days of the degree conferral date.

STEP 4: SUBMIT APPEAL TO COLLEGE

Graduate students shall submit the statement and all supporting materials to the college by sending it to the college email address linked here (<https://graduateeducation.sites.northeastern.edu/college-contacts-for-academic-appeals-and-academic-complaints/>). The appeal will be handled in accordance with the applicable academic appeals process within the relevant college, which may include appeals processes at multiple levels within the college. For academic appeals related to courses, appeals should be sent to the college that offers the course.

The statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student. If a student wishes to dispute a grade in their final term, the statement must be submitted within 28 calendar days of degree conferral date.

STEP 5. SUBMIT UNIVERSITY-LEVEL APPEAL

If the student is not satisfied with the college's disposition of the matter, or if the appeal is not resolved within 42 calendar days after originally submitted to the college pursuant to Step 4, the student may further pursue the matter by requesting in writing within 10 calendar days of the notification from the college in Step 4 that the university convene the Academic Appeals Resolution Committee to review the issue. This committee has been designated as the final authority on these matters. Students may obtain information on this process by sending email to otp-grad-education@northeastern.edu.

A. Submission

To submit a university-level appeal, graduate students shall submit a request for an academic appeal to the Office of the Provost at otp-grad-education@northeastern.edu. Upon receiving the request, the Office of the Provost will obtain the student's appeal statement, supporting documentation, and the responses from earlier appeals from the college.

B. Academic Appeals Resolution Committee

The Academic Appeals Resolution Committee shall be a standing committee consisting of the following:

- The provost or the provost's designee, who shall be the chair of the committee, and nonvoting member.
- Three faculty members and one alternate faculty member (with the alternate serving in instances where there is a conflict of interest or when a member has to be replaced) all from different colleges appointed by the Faculty Senate Agenda Committee. Members will serve a one-year term with no term limits.

If the appeal had at any point involved a matter of harassment/discrimination, the committee shall include a representative of the OUEC, who shall be a nonvoting member.

C. Preliminary Matters

If the Academic Appeals Resolution Committee determines, by a majority vote, that the appeal is patently without substance or merit, it may dismiss the appeal.

D. Investigation

The Academic Appeals Resolution Committee shall investigate the matter under appeal by studying the relevant documents (the statement, supporting documents, and additional accumulated documentation), interviewing the parties (especially the student and the involved faculty member), and taking any other action it deems appropriate. A resolution shall be rendered within 35 calendar days of appeal submission. At no time shall the committee be bound by rules of evidence but shall at all times conduct itself in a manner that is not arbitrary or capricious. The Academic Appeals Resolution Committee may, but is not required to, hold a hearing prior to resolving the issues. However, in all instances, the student and the involved faculty member shall have the right to appear separately and privately before the Academic Appeals Resolution Committee. The student shall have the right to have an advocate from the university community present during their testimony to the Academic Appeals Resolution Committee.

E. Authority to Act

The Academic Appeals Resolution Committee has been designated as the final authority on academic matters. At the conclusion of its investigation, the Academic Appeals Resolution Committee shall resolve, by majority vote, the issue by either upholding the finding of the college/school, in which case no further appeal is available, or granting such relief to the student as the Academic Appeals Resolution Committee deems appropriate. The Academic Appeals Resolution Committee shall not render a resolution that contradicts the prior findings or actions of the OUEC.

F. Resolution

All direct parties to the appeal, including but not limited to the student, the faculty member (or others involved in academic evaluations), the dean of the involved college(s), the Faculty Senate, and the Office of the University Registrar, shall be promptly informed in writing of the decisions and actions taken during this academic appeals procedure.

G. Action

The dean(s) or their designee in the involved college shall take whatever action is necessary to implement fully the resolution of the Academic Appeals Resolution Committee.

H. No Further Appeal

Once adjudicated by the Academic Appeals Resolution Committee, the matter is considered closed, and no further appeal can be instituted by the student or the involved faculty member with respect to the issue(s) raised at any level of the formal appeals resolutions procedures.

Appeals Process Timeline

Step 1: Discuss concern with faculty member	Time frame: As soon as possible after academic determination (see note below).
Step 2: Discuss with program or department administrator	Time frame: Within 10 calendar days of academic determination.
Step 3: Prepare appeal statement	
Step 4: Submit college-level appeal	Time frame: Within 28 days of academic determination. Decision notification within 42 days of appeal submission.
Step 5: Submit university-level appeal	Time frame: Within 10 calendar days of college/school decision. Resolution rendered within 35 calendar days of appeal submission.

Note: Colleges and schools will endeavor to expedite appeal responses when warranted by the circumstances.

Resources

Students may find the following resources useful:

- Office of Global Services (<https://international.northeastern.edu/ogs/>): U.S.-based F-1/J-1 international students and Canadian-based international students holding a study permit are encouraged to contact OGS to discuss potential impacts to their status.
- Office for University Equity and Compliance (<https://ouec.northeastern.edu/reporting-options/>): Students can make complaints regarding discrimination or harassment by contacting OUEC.
- Office of Student Conduct and Conflict Resolution (<https://osccr.sites.northeastern.edu/>): Students can make complaints regarding student code of conduct violations by contacting OSCCR.
- We Care (<https://we-care.studentlife.northeastern.edu/>): Students can obtain support for unexpected challenges to maintaining academic progress by contacting We Care.
- Graduate Ombuds (<https://graduateombuds.northeastern.edu/contact/>): Graduate students seeking confidential, impartial, and informal assistance regarding concerns related to their university experience can contact the Graduate Ombuds.
- Students may use the Northeastern University Anonymous Reporting Hotline (<https://secure.ethicspoint.com/domain/media/en/gui/32115/>).

Academic Calendars

The graduate schools' programs are offered on a semester calendar consisting of 15 weeks. The College of Professional Studies graduate programs are offered on a quarter calendar consisting of 12 weeks.

Quarter Programs

For student records that include quarter hours, the approved semester-hour conversion rate is (quarter hours) x 0.750. For example, a 4-credit quarter course is equivalent to a 3-credit semester course.

Semester Programs

Traditional semester hours apply.

Audit Policy

Full-time Northeastern University students may audit one class per term as an overload. In all colleges with the exception of the College of Professional Studies, there is no additional charge.

- Students are permitted to petition (https://service.northeastern.edu/registrar/?id=kb_article_view&sysparm_article=KB000019998) from the end of the course-add period to the end of the third week of classes.
- Permission is based on the availability of a seat in the class.
- Students must obtain advisor approval and meet the prerequisites and any other required approvals for the class.
- Instructor permission, as well as approval by the associate dean of the college offering the course, is required.
- The coursework required is at the discretion of the instructor.
- Once a student opts to audit a course, the audit status of the course cannot be changed.
- A signed Petition to Audit (https://service.northeastern.edu/registrar/?id=kb_article_view&sysparm_article=KB000019998) must be presented to the Office of the University Registrar during the designated audit-add period.
 - Students will not be registered for approved audited course(s) until after the add period is over for the intended term.
- Excluded courses are co-op, labs, language courses, any off-campus course, any online course, and any course required for the major or degree.
- Audits carry no academic credit.

Cooperative Education

Website (<https://www.northeastern.edu/experiential-learning/co-op/>)

Cooperative education is the cornerstone of Northeastern University's experiential learning approach, in which on-campus study is enhanced by real-world experience through full-time opportunities at locations worldwide. Graduate students have the opportunity to alternate periods of academic courses with one period of work in a position related to their academic or career interests. This combination provides an integrated learning experience that enhances both in-class studies and career development.

General Requirements

- Be a full-time student to participate in co-op.
- Completion of 16 semester hours or 24-27 quarter hours.
- Complete all pre-co-op requirements as established by the university, including the co-op preparatory course or equivalent.
- Make satisfactory progress toward degree completion, including grade-point average requirements as defined by the university.
- Have accurate information about the co-op position in the university's official co-op system of record, including specific start and end dates and meeting the minimum hour and day requirements.
- Not participate in co-op in the final term unless it is specified in the curriculum requirements of the program.
- Not participate in co-op in the term following a return from a leave of absence.
- Resolve any previous academic probation issues, or have the cooperative education coordinator approve a plan to resolve these issues prior to applying for co-op jobs.
- Have any self-developed co-op approved by the cooperative education coordinator before accepting the position.
- Comply with any preemployment checks required by the employer such as drug testing, credit checks, physical examinations, security clearance, and criminal record checks.
- Participate in Title IX training, as required.
- Work with the cooperative education coordinator if an Unsatisfactory (U) grade has been received for a past co-op to reestablish eligibility in accordance with the university's policies and requirements.

TRANSFER AND INTERNATIONAL STUDENTS

- Transfer students from other universities must have met the same requirements in their major's co-op program as nontransfers and must have completed at least one semester of classes before starting co-op.
- International students must attend one academic year, or its equivalent, and obtain proper authorization from the Office of Global Services before engaging in co-op.

Academic Requirements

1. **Be full time while on co-op. Full-time status for co-op is defined as either:**
 - a. One full-time co-op job; 32–40 hours per week
 - b. Two simultaneous half-time co-op jobs; 16–31.99 hours each
 - c. One half-time co-op job; 16–31.99 hours with graduate students taking 3 or more academic credits
2. **Meet the minimum length requirements for an academic term:**
 - a. Semester full-term: minimum of 11 weeks or 55 workdays
 - b. Quarter full-term: minimum of nine weeks or 45 workdays
 - c. Summer first-half or second-half term: minimum of five weeks or 25 workdays
3. **Receive a grade of Satisfactory or Unsatisfactory for the co-op experience.**
4. **Have a cumulative 3.000 GPA to be eligible to search for a co-op position.**

Co-op Duration

Graduate Students Enrolled in Colleges Other Than the College of Professional Studies:

- Students have the opportunity to complete one co-op for a period of four to eight months in one of the following patterns:
 - Four months (spring, fall, or summer full terms)
 - Six months (spring term plus summer first-half term, or summer second-half term plus fall term)
 - Eight months (spring term plus summer full term, or summer full term plus fall term)
- In addition, students enrolled at a Canadian campus may be hired into a co-op position for periods of four to eight months, including continuous periods spanning the fall and spring semesters. In the case of such eight-month fall/spring term co-op assignments, students are required to enroll full time in classes during the summer term immediately following the assignment. If a student only needs to take one additional course to complete their program's requirements, they are only required to enroll in that one class in the summer term immediately following the

assignment. In some programs, Canadian students may be eligible for a 12-month co-op position. Please contact your co-op advisor to learn more.

Graduate Students Enrolled in the College of Professional Studies:

- Students may be hired into co-op positions for periods of three months or six months.

Co-op Financial Planning

- No tuition is charged while a student is on co-op only (students will pay room and board if they stay in university housing).
- If a student takes a credit-bearing class while on co-op, tuition will be charged at the per-credit rate.
- Students who wish to register for more than 4 credits while on full-time co-op must complete the Petition Registration form (https://service.northeastern.edu/registrar/?id=kb_article_view&sysparm_article=KB000020003).
- Financial aid will be distributed to match the student's tuition bill and other allowable expenses.
- Students on co-op are required to maintain the same health insurance coverage (either through a private provider or through the university program) as they would while attending classes.

Registration for Co-op

Students are registered for co-op based on a completed co-op record that meets the minimum hour and day requirements with accurate start and end dates in the university's official co-op database system. Students must be registered for the co-op work experience course by the end of the add period or alternately registered for classes if still searching for a job by this deadline. All co-op positions need to be approved by the university and entered as completed records in the official co-op database system by the last day to drop without a W for the respective semester.

Further Information

For more detailed information about co-op policies and procedures, see the *Cooperative Education Student Handbook* on the Cooperative Education website (<https://www.northeastern.edu/experiential-learning/co-op/>).

Course Credit Sharing

Sharing of course credit refers to the practice of allowing one or more course(s) to satisfy the requirements of more than one credential offered by Northeastern University. Credentials covered by this policy include any certificate or degree offered by the university. The following policy refers to the sharing of credit among programs offered by Northeastern. Sharing of credit between programs at Northeastern and another institution is specified through an articulation agreement and is not governed by this policy.

General Credit Sharing Policies

Course credits may be shared between two credentials only if approved by the college or colleges offering both credentials.

To be shared with a credential, credits must be earned no more than seven years before starting the credential.

Specific Credit Sharing Policies

- Shared credits may not be used to fulfill the requirements of more than two degrees.
- A limit of one course (up to 4 semester hours) may be used to fulfill the requirements of two graduate certificates.
- Appropriate graduate credits taken as part of a graduate certificate program may be counted toward a graduate degree or a Certificate of Advanced Graduate Study.
- Students cannot apply the same set of courses toward both a graduate certificate and a concentration in the same field of study.
- Credits earned to fulfill the requirements of a master's program may not be used to fulfill more than 50% of the credits of another master's program or a CAGS.
- Students may credit-share specified courses taken while in undergraduate status for both the bachelor's and PhD degrees. A student who departs from the program before receiving PhD candidacy may opt to use those courses toward a master's degree earned. However, such credit sharing cannot be used for more than two credentials.
- Courses taken while a student is in undergraduate status and participating in a professional doctorate program at Northeastern may be used to fulfill the requirements for both the undergraduate and professional doctorate degree, up to a limit of 40% of the credits required for the professional doctorate.
- Appropriate credits taken as part of a master's degree may be counted toward a professional doctorate.
- Not more than four graduate courses or 16 semester hours, whichever is greater, taken while a student is in undergraduate status and participating in an accelerated master's (PlusOne) program at Northeastern, may be used to fulfill the requirements for both the undergraduate and graduate degrees. Exceptions to this credit sharing limit (due to significantly higher credit requirements for the graduate degree or other special provisions) must be approved through governance processes.
- Undergraduate students who wish to pursue a double major, second Northeastern bachelor's degree, or a minor should follow the credit sharing policies described in the undergraduate section of this catalog (<https://catalog.northeastern.edu/undergraduate/academic-policies-procedures/degrees-majors-minors/>).

Departmental Jurisdiction

Certain departments of the university shall have the power to set down rules and regulations governing the operation of the departments' respective areas of responsibility. Such rules and regulations shall be in accord with the Student Bill of Academic Rights and Responsibilities (p. 124), as well as with the policies described in this document.

Dropping a Class

Not attending class does not constitute withdrawal. Students receiving a grade of W or NE in any course are responsible for the costs associated with that course. Students must drop courses using processes described below.

Note: College of Professional Studies graduate students should consult the CPS graduate section of this catalog (p. 991) for class drop timelines specific to CPS graduate terms.

- Full-semester class: Through the first 14 calendar days of the term, students may withdraw from a class during the add/drop period without any grade being posted to the transcript. Courses may be dropped via the Student Hub (<https://me.northeastern.edu/>).
- Half- and graduate third-term classes: Through the first seven calendar days of the term, students may withdraw from a class during the add/drop period without any grade being posted to the transcript. Courses may be dropped via the Student Hub (<https://me.northeastern.edu/>).
- Following the add/drop period through the day before the last week of the term, withdrawals are indicated by a W on the student's record. Courses may be withdrawn via the Student Hub.
- During the last week of the term, no withdrawals are accepted for any reason. A letter grade for the course will be posted on the transcript.
- Dropping below full-time enrollment may affect financial aid, health insurance eligibility, and the maintenance of proper nonimmigrant visa status.
- Tuition financial adjustments are calculated based on the university's refund schedule for course withdrawals. See the Student Financial Services (<https://studentfinance.northeastern.edu/policies-procedures/>) website for more information.

Final Examinations and Related Policies on Other Exams

All final examinations, term papers, or projects must be returned to the student or be retained by the department for a period of one year.

Minimum Cumulative GPA

Grades submitted to satisfy, in whole or in part, the requirements for any graduate degree or certificate of advanced study must yield a cumulative GPA of 3.000 or higher. This requirement may be supplemented by additional restrictions established by the graduate program or the college's graduate office such as, but not limited to, the maximum number of individual courses with grades below 3.000 that may be obtained without being required to withdraw or a minimum GPA in each semester.

Students falling below 3.000 are placed on academic probation. If the student remains on academic probation for two semesters, they may be terminated from the graduate program.

Not more than two courses or 6 semester hours of credit, whichever is greater, may be repeated to satisfy the requirements for the degree. The last grade earned in each of these repeated courses is counted in the calculation of the cumulative GPA.

More information regarding course grading and academic disputes may be found at Academic Appeals Policies and Procedures (p. 133).

Overload Conditions for Graduate Assistants

Graduate assistants are expected to devote full-time effort to their studies and the duties of their award.

They are not permitted to hold any other job during the term of their assistantship; however, they may be offered limited extra work on campus. Graduate assistants who are not on F-1 or J-1 visas can be offered overload work that does not exceed an average of 6 hours a week or 90 hours a semester, for a total of 270 hours a year (or three semesters). As part of this work, graduate assistants may be hired to teach one 3-semester-hour course as an overload during the year (180 hours). The hours worked during the weeks between semesters are included in this total.

Satisfactory/Unsatisfactory Grading

The individual schools and colleges determine whether a course will be graded on a satisfactory/unsatisfactory basis.

Student Complaints

Academic complaints are submitted when a student has a complaint about a course, a program, curricula, instruction, or any other issues related to a student's academic experience at Northeastern University.

Students who would like to submit an academic complaint should complete the steps listed below.

Students who would like to appeal an academic determination, such as a grade in class, should submit an academic appeal.

Resources

Students may find the following resources useful:

- **Office of Global Services:** U.S.-based F-1/J-1 international students and Canadian-based international students holding a study permit are encouraged to contact OGS (<https://international.northeastern.edu/ogs/>) to discuss potential impacts to their status.
- **Office for University Equity and Compliance:** Students can make complaints regarding discrimination or harassment by contacting OUEC (<https://ouec.northeastern.edu/>).
- **Office of Student Conduct and Conflict Resolution:** Students can make complaints regarding student code of conduct violations by contacting OSCCR (<https://osccr.sites.northeastern.edu/>).
- **We Care:** Students can obtain support for unexpected challenges to maintaining academic progress by contacting We Care (<https://we-care.studentlife.northeastern.edu/>).
- **Graduate Ombudsperson:** Students seeking confidential, impartial, and informal assistance regarding concerns related to their university experience can contact the Ombuds for Graduate Students (<https://graduateombuds.northeastern.edu/contact/>).
- **Anonymous and Confidential Reporting Hotline:** Students may also use the university's Anonymous and Confidential Reporting Hotline (<http://northeastern.ethicspoint.com/>).

Academic Complaint Process

STEP 1: DISCUSS WITH FACULTY MEMBER OR ACADEMIC ADVISOR

Students are encouraged to first speak informally with their instructor, other faculty member(s) involved, or an academic advisor about any concerns related to their courses or program. If a student is not comfortable discussing the matter with a faculty member or academic advisor, the student should proceed to Step 2.

STEP 2: DISCUSS WITH ADMINISTRATOR IN YOUR PROGRAM OR ACADEMIC UNIT

If after this conversation the student's concerns remain unresolved to their satisfaction, or if the student is not comfortable discussing the issue with the instructor, other faculty member(s) involved, or academic advisor, the student should request a meeting with the appropriate administrator (e.g., program director, department chair, group leader, or director of graduate studies) to further discuss their concerns. Students should email the college contact listed in Step 3 to inquire about the appropriate person to contact.

STEP 3: COLLEGE-LEVEL REVIEW

Students whose concerns remain unresolved to their satisfaction should submit their concerns using the contact information provided here (<https://graduateeducation.sites.northeastern.edu/college-contacts-for-academic-appeals-and-academic-complaints/>) and follow the college complaint or grievance process.

STEP 4. UNIVERSITY-LEVEL REVIEW

If the student wishes to appeal the decision of the college, they should describe their concerns in an email to the Office of the Provost (OTP-grad-education@northeastern.edu).

Regulations and Requirements for All Graduate Degree Programs

A copy of each graduate degree program as approved by the Board of Trustees and as officially amended is on file in the Office of the Provost. This record contains the goals, learning objectives, and all requirements for the program. All descriptions of the program in the university, college, and department publications must conform to this officially approved record.

Standards of admission are specific to certificate and degree programs and are found on each college's or offering unit's website.

Admission Requirements

Prior to beginning a graduate program at Northeastern University, students must have met one of the following criteria:

1. Received a bachelor's degree or equivalent from an accredited college or university
2. Received a master's degree or equivalent degree from an accredited college or university
3. Received a first professional or equivalent degree from an accredited college or university
4. Been accepted into an approved bachelor's-to-graduate-degree program at Northeastern

Deferment of Enrollment Due to Military Deployment or Call to Service

When a student who has confirmed their intent to enroll in a Northeastern University degree program is to be deployed or called to active duty prior to matriculation, they may submit a request for enrollment deferment. For U.S. military cases, students must apply to the Director of Military Affiliated Enrollment and Financial Services. International students should follow the Admission Acceptance Deferral process set forth by the Admissions Office and the Office of Global Services. The respective office will notify the destination academic program of the student's intent to defer.

The enrollment deferment request shall follow established procedures that include official proof of deployment (or qualifying call to service) and estimated term of future enrollment (if known).

Under this type of deferment, the following conditions will apply:

- Any deposit for the program will be waived and any deposit payment made previously will be credited to the student's account.
- An enrollment deferment shall be posted to the students' admission record, not to exceed two years beyond the first day of the original term of enrollment.
- If the deferment due to deployment or active service continues beyond two years, the student may request further deferment; however, the university reserves the right to request that the student reapply for admission in those cases.

When the admitted student intends to enroll in the university after completion of military obligation, U.S. military-affiliated students will notify the Director of Military Affiliated Enrollment and Financial Services in writing, including the term they intend to enroll. International students should follow the procedures on the Office of Global Services website for securing the appropriate immigration documentation to join Northeastern for their intended term. The university reserves the right to delay the student's start term from their intended term due to curriculum alignment or accreditation enrollment caps.

Transfer and Other Advanced Standing Credit

Transfer credits from other institutions (or other programs within the university) will only be accepted at the discretion of the student's destination academic unit and the associated college with the following constraints:

- For graduate certificate programs, a maximum of 3 semester hours or 4 quarter hours of credit earned at another institution may be accepted toward the credential being pursued at Northeastern, provided the credits meet the above-listed standards.
- For master's degree programs, a maximum of 30% of the credits required for the degree that are earned at another institution may be accepted toward the degree being pursued at Northeastern, provided the credits:
 1. Consist of work taken at the graduate level for graduate credit
 2. Carry grades of 3.000 or better
 3. Have been earned at an accredited institution
 4. Have not been used toward any baccalaureate or advanced degree or certificate at another institution

Advanced standing is based on criteria established by the offering school or college and implemented in coordination with the Office of the University Registrar. When applied, advanced standing reduces the total credits required to complete the primary program.

The combination of advanced standing and transfer credit shall not exceed 30% of the credits required for the degree. Credit for prior experiential or non-collegiate-sponsored learning is limited to 25% of the degree credits required for the degree.

Transfer credit may not be applied to graduate degrees that are completed as part of a PlusOne program.

- For doctoral programs, a maximum of 30% of the total semester hours of required coursework may be granted upon the recommendation of the admitting college's graduate committee.

- For students pursuing the JD degree, a maximum of 34 semester hours required for the degree that are earned at another ABA-accredited institution, and which must be substantially equivalent to the first-year curriculum, may be accepted toward the degree being pursued at Northeastern.

Transfer credits must have been earned within five academic years of the date of matriculation in the Northeastern program to which they are to be applied.

Grades earned in courses to be applied as transfer credits are not counted as part of the overall grade-point average earned at Northeastern and are posted with a grade of T to the transcript.

Provisional or Special Students

Students cannot be admitted under provisional conditions, i.e., requiring preparatory or remedial coursework that must be successfully completed for progression in the program. Special students are nondegree students taking courses, not to exceed 12 semester or 16 quarter hours, while not admitted to a specific program.

Uniform Credit System

One credit hour of academic credit consists of three hours of work per week throughout the term, usually one hour of class contact and two hours of outside work. When students are registered for thesis credits, directed study, or internship, the appropriate number of credit hours will be determined using the same method. Programs may vary the ratio of class time to preparation time depending on the learning outcomes and accreditation standards appropriate in their field(s).

A quarter hour is evaluated as three-quarters of a semester hour.

When students are registered for thesis credits, directed study, or internship, the appropriate number of credit hours will be determined using the same method.

Additional information on course and credit guidelines can be found here (p. 112).

Undergraduate Credit for Graduate Courses

Undergraduate students who are juniors or seniors may enroll in graduate courses for credit toward their undergraduate degrees if they meet all prerequisites as determined by the graduate director and they receive permission from the instructor of the course and from the student's undergraduate academic advisor.

Time Limit for Course Credit

Course credits earned in the program of graduate study, or accepted by transfer, are valid for a maximum of seven years unless the relevant graduate office grants an extension.

Academic Progression

Grades submitted to satisfy, in whole or in part, the requirements for any graduate degree or certificate of advanced study must yield a cumulative GPA of 3.000 or higher. This requirement may be supplemented by additional restrictions established by the graduate office such as, but not limited to, the maximum number of individual courses with grades below 3.000 that may be obtained without being required to withdraw or a minimum GPA in each semester.

Students falling below 3.000 will be placed on academic probation. If the student remains on academic probation for two terms, they may be terminated from the graduate program. A PhD student will be considered to be on academic probation if their cumulative GPA falls below 3.000 and/or if they are not making acceptable research progress as defined by the college through an academic review process that occurs at least annually.

No more than two nonrepeatable courses may be retaken to satisfy the curricular requirements for the degree. A specific course may not be retaken more than once. The last grade earned in each of the retaken courses will be counted in the calculation of the cumulative GPA. Courses with a specified attribute of "repeatable" can be repeated up to the specified limit, and the earned grade in each occurrence of course completion will count toward the calculation of the cumulative GPA.

Any incomplete grades must be cleared in accordance with the university's policy concerning incomplete grades (p. 123).

Language Requirements

The committee in charge of the degree program may establish a language requirement.

Required Training

Graduate programs may require relevant training that all of the program's students must complete by deadlines communicated by the university or by the student's graduate program advisor.

Regulations and Requirements for Graduate Certificate Programs

Certificates That Appear on the Transcript

DEFINITION

A graduate certificate program is a program of study requiring at least three graduate courses and not fewer than 12 semester hours or 16 quarter hours of graduate credit. Successful completion of such a certificate program will be recorded on the student's transcript.

ADMISSION

All students admitted to a certificate program must satisfy the general requirements for admission as a graduate student and the requirements for the specific certificate program.

PROCEDURES FOR THE APPROVAL OF NEW CERTIFICATE PROGRAMS

New certificate programs are developed following the procedure outlined in the Guidelines for New Degree Programs found on the Office of the Provost website. (https://provost.northeastern.edu/wp-content/uploads/NewGraduateCertificate-Non-CAGS-ProposalGuidelines_5.11.17.pdf)

All new certificate programs require the approval of the University Graduate Curriculum Committee and notification of the Faculty Senate.

PROCEDURES FOR CERTIFICATE PROGRAM REVIEW

Certificate programs will be reviewed in the context of departmental reviews. Information about these reviews can be found on the Office of the Provost website. (<https://provost.northeastern.edu/wp-content/uploads/Guidelines-for-Academic-Program-Review.-December-2022.-Final.pdf>)

GENERAL REGULATIONS

Except as indicated herein, certificate programs shall be subject to the same regulations and procedures as master's degree programs.

TRANSCRIPT NOTATION

Only approved degrees, certificates, and concentrations appear on the transcript.

Regulations and Requirements for the Master's Degree

Admissions Requirements

All students admitted to a master's program must satisfy the general requirements for admission as a graduate student and the requirements for the specific master's program. To be eligible for admission, with the exception of PlusOne students, applicants must have a bachelor's degree from an accredited college or university.

Course Requirements

A candidate for the master's degree must satisfactorily complete an approved program conforming to the requirements of the graduate school and department or program in which the candidate is registered.

The requirements for the master's degree are a minimum of 30 semester hours beyond the bachelor's degree, except in the College of Professional Studies in which 45 quarter hours of graduate work are required. Undergraduate-level coursework will not be accepted to meet the requirements for the master's degree.

Comprehensive Examination

The committee in charge of the degree program may require a final written or oral comprehensive examination(s) for partial fulfillment of degree requirements.

Thesis

If a thesis is required in partial fulfillment of degree requirements, it must show independent work based, in part, on original material and must meet the approval of the student's thesis committee. The committee in charge of the degree program is responsible for providing instructions concerning preparation of the thesis.

The student must submit the thesis to ProQuest (or a university-sanctioned successor system) according to the time schedule provided by the relevant graduate office. Information on archiving a thesis is available in the relevant graduate office.

Regulations and Requirements for PlusOne Degree Combinations

PlusOne program refers to any program in which students accelerate the attainment of the postbaccalaureate degree by applying graduate credits taken as an undergraduate toward both the undergraduate and graduate degrees. For more regulations concerning PlusOne programs, please see Course Credit Sharing (p. 139).

Regulations and Requirements for Professional Doctorate Degree Programs

Admissions Requirements

A student enrolled in a professional doctorate degree program must satisfy the general requirements for admission as a graduate student and the requirements for the specific professional doctorate degree program. To be eligible for admission, applicants must have a bachelor's degree from an accredited college or university.

Academic Classification and Degree Candidacy

- Doctoral student: Students in this classification have been admitted to a doctoral program.
- Doctoral candidate: Each program in which the term candidacy is used shall have a policy defining candidacy. Students in this classification will have completed all departmental, college, and university requirements except for the dissertation (if applicable). These requirements vary by program but minimally include completion of approximately 30 semester hours or 45 quarter hours of acceptable graduate work beyond the bachelor's degree or possession of a previously earned master's degree that is acceptable to the department and certification by the graduate office. The requirements frequently include a comprehensive examination and/or a proposal defense.

Academic Residency Requirement

In the context of a doctoral degree program, the residency requirement refers to either:

- A minimum number of credits or semesters that must be completed at the degree-granting institution
- A minimum duration during which the degree candidate must be enrolled full time at the degree-granting institution

In those programs in which the term candidacy is used, after reaching candidacy, students must register for Dissertation for a minimum of two semesters in order to fulfill their formal residency requirement. Continuation status enrollment is for students who are postcandidacy, have completed all coursework and their residency requirement, and are actively engaged in completing a dissertation.

Responsible Conduct of Research

All doctoral students for whom Responsible Conduct of Research training is required must complete training according to the university's Policy on Responsible Conduct of Research (<https://policies.northeastern.edu/policy500/>).

Course Requirements

A candidate for the professional doctorate degree must satisfactorily complete an approved program conforming to the requirements of the graduate school and department or program in which the candidate is registered.

The requirements for the professional doctorate degree shall be determined by the program.

Undergraduate-level coursework will not be accepted to meet the requirements for the professional doctorate degree.

Qualifying Examination(s)

In departments that require qualifying examinations, students must be notified in writing of the nature and regulations governing these examinations and of how their performance on the examinations will affect their normal progress toward the degree. The graduate office shall be made aware of the department regulations concerning such examinations.

Dissertation Committee

For programs requiring the dissertation, the dissertation committee shall have at least three members, two of whom shall be from Northeastern University. The chair of the dissertation committee will be a faculty of Northeastern and will hold an appropriate terminal degree for the discipline. Exceptions to this policy may be granted by the dean of the relevant college (or their designee) based on the qualifications and experience of the faculty member who would serve as chair.

Comprehensive Examination

For programs requiring a comprehensive examination, the committee in charge of the degree program may require a final written or oral comprehensive examination(s) for partial fulfillment of degree requirements.

Thesis or Dissertation in Practice

If a thesis or dissertation in practice is required in partial fulfillment of degree requirements, it must show independent work based, in part, on original material and must meet the approval of the student's thesis committee. The committee in charge of the degree program is responsible for providing instructions concerning preparation of the thesis.

The student must submit the thesis to ProQuest (or a university-sanctioned successor system) according to the time schedule provided by the relevant graduate office. Information on archiving a thesis is available in the graduate office.

Time Limitation for Achieving Candidacy and Degree Completion

For programs in which the term candidacy is used, degree candidacy must be achieved within three years of entering the doctoral program. For all programs, the degree must be completed within seven years after entering the program. A student may request an extension of these time frames from the graduate office.

Pursuit of an Academic Credential Outside Student's Major

A student enrolled in a doctoral program may seek to pursue academic credentials (e.g., master's degree or certificate) outside of their major only if, prior to completing more than one-third of the required credits for that credential, they obtain the approval of their primary advisor, obtain the approval of the graduate office, and apply to and are accepted into the major offering that credential.

Regulations and Requirements for the Certificate of Advanced Graduate Study

The Certificate of Advanced Graduate Study provides specialized study above the master's degree. It is a course of study that falls between the master's and doctoral degree and culminates in a graduate certificate.

Admissions Requirements

An applicant for the CAGS must hold a master's degree in a related field from an accredited institution and must complete the admission procedure described in the material of the graduate schools. All students admitted to a CAGS program must satisfy the general requirements for admission as a graduate student and the requirements for the specific CAGS program.

Course Requirements

A candidate for the CAGS must satisfactorily complete an approved program conforming to the requirements of the graduate school and department or program in which the candidate is registered. The candidate must complete a minimum of 24 semester hours or, in the case of the College of Professional Studies, 32 quarter hours of credit beyond the master's degree.

Regulations and Requirements for Doctor of Philosophy (PhD) Programs

The formal requirements for the PhD degree are the following: completion of the coursework mandated by the individual degree program, fulfillment of the residency requirement, formal training in the Responsible Conduct of Research for students as appropriate, qualifying and/or comprehensive examination(s) or equivalent as required by the degree program, continuous registration, a final oral examination conducted by the student's PhD committee, and submission of a dissertation to the relevant graduate office and to ProQuest (or a university-sanctioned successor system) for archiving. The dissertation must be based on original and independent research.

Admissions Requirements

All students admitted to a doctor of philosophy program must satisfy the general requirements for admission as a graduate student and the requirements for the specific PhD program.

Academic Classification and Degree Candidacy

1. Doctoral student: Students in this classification have been admitted to a doctoral program.
2. Doctoral candidate: Every degree program shall have a policy defining candidacy. Students in this classification will have completed all departmental, college, and university requirements except for the dissertation. These requirements vary by program but minimally include completion of approximately 30 semester hours of acceptable graduate work beyond the bachelor's degree or possession of a previously earned master's degree that is acceptable to the admissions committee and certification by the graduate office. The requirements frequently include a comprehensive examination and/or a proposal defense.

Academic Residency Requirement

In the context of a doctoral degree program, the residency requirement refers to either:

1. A minimum number of credits or semesters that must be completed through the degree-granting institution
2. A minimum duration during which the degree candidate must be enrolled full time at the degree-granting institution

After reaching candidacy, students must register for Dissertation for a minimum of two consecutive semesters in order to fulfill their formal residency requirement. Continuation status enrollment is for students who are postcandidacy, have completed all coursework and their residency requirement, and are actively engaged in completing a dissertation.

Responsible Conduct of Research

All doctoral students for whom Responsible Conduct of Research training is required must complete training according to the university's Policy on Responsible Conduct of Research (<https://policies.northeastern.edu/policy500/>). (https://www.northeastern.edu/policies/Policy_on_Responsible_Conduct_of_Research.pdf)

Course Requirements

The program committee in charge of the degree program specifies the doctoral course requirements.

Requirements for Candidacy

In programs that require qualifying examinations, students must be notified in writing of the nature and regulations governing these examinations and of how their performance on the examinations will affect their normal progress toward the degree. The graduate office shall be made aware of the program regulations concerning such examinations.

Annual Review of Student Progress

Units shall define milestones for achieving satisfactory academic progress and shall establish a published process by which the academic progress of every PhD student will be evaluated through an annual review. A copy of each review shall be submitted to the student and the graduate office. If the annual academic review reports that a student is not making sufficient academic progress due to research performance, the PhD student will be placed on academic probation. After two consecutive semesters on academic probation, the student may be dismissed.

PhD Dissertation Committee

The dissertation committee shall have at least three faculty members, two of whom shall be from Northeastern University. The chair of the dissertation committee (who is presumed to be the thesis advisor) will be a full-time tenured or tenure-track member of the faculty of Northeastern and will hold a PhD (or other research doctorate) or an appropriate terminal degree for the discipline. Colleges, the provost, or provost-designee may permit full-time faculty from other ranks: on a case-by-case basis to serve in this role based on the research qualifications and experience of individual faculty members or based on equivalent faculty definitions at locations operating under different faculty rank systems.

The PhD committee should be appointed early enough to advise in the formulation of the student's program and in refining the research topic for the dissertation. Within the constraints of the above criteria, the PhD program faculty will determine the process by which dissertation committees are established. The final list of dissertation committee members shall be reported to the college's associate dean for graduate education or administrative unit managing the degree program.

If a student's major advisor leaves Northeastern (including transition to emeritus status), that person may continue the research direction of the dissertation or thesis. However, a co-advisor must be appointed from the academic department or program. The student will then have two advisors, one an official member of the Northeastern faculty who will be available for research and administrative matters and the ex-Northeastern advisor. If a new major advisor is appointed, the former Northeastern faculty member may serve as an outside member of the committee.

Comprehensive Examination(s) and/or Proposal Defenses

Degree programs may require a comprehensive examination(s) and/or an oral defense of the dissertation proposal as the final step before becoming a PhD candidate. The purpose of the comprehensive examination(s) is to test the knowledge and skills of the student in a particular area and their knowledge of recent research developments in the field. The administrative home unit for each PhD program shall establish the process by which comprehensive examination committees are established. Units may require an oral defense of the dissertation proposal in lieu of, or in addition to, a comprehensive examination.

Dissertation

Candidates for the degree of Doctor of Philosophy must complete a dissertation that embodies the results of extended research and makes an original contribution to the field.

Oral Defense of the Dissertation

An oral defense of the dissertation is required and must be held at least 14 calendar days before the degree conferral date. The defense shall be public and conducted with the committee members present either in person or via electronic means. After the public session, a private session may be held to examine material that is subject to a confidentiality agreement. Following the presentation, the candidate will field questions from the committee in public or private. In the case where neither the candidate nor the committee members are present in person on campus (i.e., the candidate and all committee members are connected only remotely via electronic means), there shall be a location established and technology enabled for public, in-person attendance of the defense by the university community and this accommodation made known to the university.

Submission of the Dissertation

The student must submit the dissertation to ProQuest (or a university-sanctioned successor system) according to the time schedule provided by the relevant graduate office.

Time Limitation for Achieving Candidacy and Degree Completion

Degree candidacy must be achieved within three years of entering the PhD program, and the PhD degree must be completed within seven years after entering the PhD program. A student may request an extension of these time frames from the graduate office.

Pursuit of an Academic Credential Outside Student's Major

A student enrolled in a PhD program may seek to pursue academic credentials (e.g., master's degree or certificate) outside of their major only if, prior to completing more than one-third of the required credits for that credential, they obtain the approval of their primary advisor, obtain the approval of the graduate office, and apply to and are accepted into the major offering that credential.

Regulations and Requirements for Interdisciplinary Graduate Degrees

Northeastern University offers both university- and college-approved interdisciplinary graduate programs for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. The program will correspond in scope and depth to Northeastern's established degree standards but need not agree exactly with the regulations of individual units.

The general regulations and requirements for graduate programs apply to all interdisciplinary programs. Additional requirements are as follows.

Interdisciplinary degrees approved by the Board of Trustees and with curriculum listed in the *Graduate Catalog* will be administered by a unit designated by the provost. The unit may be within the Office of the Provost or within a college. Faculty oversight of these programs will be through a designated program committee or oversight group. For programs in colleges, the processes followed shall be determined by that unit. For degree programs administered through the Office of the Provost, a faculty group appointed by the provost will provide the faculty oversight.

Definitions

- "College" refers to the College of Arts, Media and Design; the Bouvé College of Health Sciences; the D'Amore-McKim School of Business; the Khoury College of Computer Sciences; the College of Engineering; the College of Professional Studies; the College of Science; the College of Social Sciences and Humanities; the School of Law; and Mills College at Northeastern.
- "Graduate office" refers to either the designated graduate administration office in the a college (as defined above) or an equivalent academic and academic support office that exists outside a college that serves the functions of a college-based graduate office.
- "Graduate program" refers to all postbaccalaureate degree, nondegree, and certificate programs and packages of courses offered for graduate credit. Graduate programs shall not include programs or courses that are offered by the School of Law in support of the JD or LLM degree.

PhD Programs

Overview

Northeastern University offers the PhD programs listed below. Included in this list are Cross-Disciplinary Science PhD Programs, where students may pursue a PhD program that blends curriculum across two departments in the College of Science, such as psychology with marine and environmental science.

In addition, PhD students are encouraged to pursue additional graduate certificates to enhance their professional development including the Postsecondary (p. 1362) Teaching (<https://catalog.northeastern.edu/graduate/additional-programs/postsecondary-teaching-graduate-certificate/>), Global Doctoral Research (p. 1361), and Experiential PhD Leadership (p. 157). The Experiential PhD (p. 157) page has additional information on doctoral opportunities that connect Northeastern to industry, government, and nonprofit partners.

B

- Bioengineering, PhD (p. 471) (Boston)
- Bioengineering, PhD (p. 479) (Portland)
- Biology, PhD (p. 1121) (Boston)
- Biomedical Science, PhD (p. 915) (Boston)

C

- Chemical Engineering, PhD (p. 500) (Boston)
- Chemistry, PhD (p. 1141) (Boston)
- Civil and Environmental Engineering, PhD (p. 516) (Boston)
- Computer Engineering, PhD (p. 546) (Boston)
- Computer Science, PhD (p. 329) (Boston)
- Counseling Psychology, PhD (p. 849) (Boston)
- Criminology and Justice Policy, PhD (p. 1246) (Boston)
- Cross-Disciplinary Science PhD Programs (p. 1218) - see available programs below (p. 156)
- Cybersecurity, PhD (p. 418) (Boston)

E

- Economics, PhD (p. 1253) (Boston)
- Electrical Engineering, PhD (p. 551) (Boston)
- Electrical Engineering, PhD (p. 553) (Oakland)
- English, PhD (p. 1260) (Boston)

H

- History, PhD (p. 1265) (Boston)
- Human Movement and Rehabilitation Sciences, PhD (p. 831) (Boston)

I

- Industrial Engineering, PhD (p. 614) (Boston)
- Interdisciplinary, PhD (p. 158) (Boston)
- Interdisciplinary, PhD (p. 160) (Portland)
- Interdisciplinary Design and Media, PhD (p. 237) (Boston)
- Interdisciplinary Engineering, PhD (p. 486) (Boston)

M

- Marine and Environmental Sciences, PhD (p. 1165) (Boston)
- Mathematics, PhD (p. 1178) (Boston)
- Mechanical Engineering, PhD (p. 619) (Boston)
- Medicinal Chemistry and Drug Discovery, PhD (p. 921) (Boston)

N

- Network Science, PhD (p. 241) (Boston)
- Nursing, PhD (p. 888) (Boston)

P

- Personal Health Informatics, PhD (<https://catalog.northeastern.edu/graduate/computer-information-science/health-informatics/personal-health-informatics-phd/>) (Boston)
- Pharmaceutics and Drug Delivery, PhD (p. 927) (Boston)
- Pharmacology, PhD (p. 933) (Boston)
- Physics, PhD (p. 1193) (Boston)
- Political Science, PhD (p. 1270) (Boston)
- Population Health, PhD (p. 866) (Boston)
- Psychology, PhD (p. 1215) (Boston)
- Public Policy, PhD (p. 1278) (Boston)

S

- School Psychology, PhD (p. 851) (Boston)
- Sociology, PhD (p. 1313) (Boston)

Cross-Disciplinary Science PhD Programs

- Biophysics, PhD (p. 1219) (Boston)
- Human Behavior and Sustainability Sciences, PhD (p. 1169) (Boston)

Graduate Certificates Available to PhD students for Professional Development

- Experiential PhD Leadership (p. 157)(Boston)
- Global Doctoral Research (p. 1361) (Boston)
- Postsecondary Teaching (p. 1362) (Boston)

PhD Network

The PhD Network works with Northeastern's colleges to produce career-ready, dynamic researchers with the deep knowledge and real-world skills and literacies they need to shape global and societal solutions—in academia and industry.

At Northeastern, every PhD student has opportunities to acquire experience beyond traditional dissertation research. Exposure to and integration with our many industry and academic partners—through internships, fieldwork, and other collaborations—and in authentic settings—from laboratories, startup companies, and nonprofit institutions—lead to research with greater impact and broader career opportunities, both within and beyond academia. The PhD Network works with internal and external partners to grow and facilitate opportunities for PhD students.

Shared values unite PhD-centered activities at Northeastern:

- **Excellence with purpose:** All PhD programs combine academic rigor with societal impact, preparing critical thinkers to tackle the world's most challenging problems.
- **Innovative thinking:** Our education programs, mentoring activities, and research scholarship develop novel content and pathfinding approaches.
- **Crossing boundaries:** PhD students transcend disciplinary and international boundaries during their innovative educational journey.
- **Integrative education:** The integration of scholarship and research training with collaborative fieldwork and professional development provides a uniquely experiential education.
- **Inclusive diversity:** Students and faculty from diverse cultures and backgrounds drive excellence by bringing a wide range of perspectives to our distinctive programs.

Explore the PhD Network website (<https://phd.northeastern.edu/network/resources/>) to learn more about:

- Resources that support PhD students' educational, professional, and personal lives
- Events created especially for PhD students, both at Northeastern and through our partners
- Funding in support of fellowships, internships, and conference attendance

Experiential PhD (Boston)

Overview

The future of research will be collaborative. Researchers across academic institutions, industry, government, and other organizations will team up to solve complex real-world problems. Researchers will require technical proficiency as well as the ability to work with others, form teams, manage projects, and more—skills that go beyond the classroom. At Northeastern University, every PhD student and postdoctoral research associate has opportunities to acquire experiences beyond traditional research. Exposure to and integration with our many partners through unique programs in authentic settings from laboratories to startup companies to nonprofit institutions leads to greater impact and broader career opportunities, both within and beyond academia.

The LEADERs Program (p. 157) is designed to enable researchers to develop professional skills through authentic career exploration opportunities at organizations in industry, government, and the nonprofit sector. Beyond the comfort zone of their own university research group, PhD students and postdoctoral research associates encounter new experiences that help shape their research perspective. They also bring fresh ideas and talent to their host organizations. Northeastern is one of the only universities in the world to offer students in all of its research-based doctoral-degree programs the option to learn and pursue research outside of their primary research group. These real-world placements are highly flexible and customizable, tailored to meet the needs of both Northeastern's PhD students and postdoctoral research associates and our institutional partners.

The Industry PhD (p. 158) is a first-of-its kind research-based doctoral program for full-time master's-level employees. Designed with input from external partners, employees pursue a research-based doctoral degree while maintaining their job and conducting research at the employer site. This enables employees to acquire new skills that will help them to advance in their careers and provides the organization with an opportunity to invest in their future leaders. By working closely with Northeastern faculty, employees will explore their research from a broader scientific perspective, enabling them to appreciate the research foundation of their day-to-day work and to pursue new areas of research for the company.

Experiential PhD opportunities offer robust benefits to both students and institutional partners. Students solve complex problems as part of their education and chart careers as future innovators. Our institutional partners receive many benefits as well, including:

- A deeper engagement in rapidly evolving fields of research
- Access to university facilities and senior faculty expertise
- Opportunities for senior leadership to mentor and copublish with students and to serve on their dissertation committees
- A chance to recruit emerging talent
- Opportunities to partner with Northeastern, an entrepreneurial research university known for its innovative collaborations with academia, government, and industry

Experiential PhD Leadership, Graduate Certificate

Experiential PhD Leadership, Graduate Certificate (Boston)

At Northeastern University, PhD students and postdoctoral researchers enjoy a uniquely broad range of immersive opportunities to expand critical inquiry, learn, perform original research, and chart a path to professional success. Experiential PhD opportunities enable PhD students to step outside the comfort zone of their campus research group where students can pursue challenging, creative, customized assignments within industry, government, or the nonprofit sector that inform and enhance their pursuit of a research doctorate. Experiential PhD gives postdoctoral researchers the opportunity to bring new skills to their positions at Northeastern.

This Graduate Certificate in Experiential PhD Leadership aims to:

- **Challenge students to address complex problems** through experience within the context of real-world needs and challenges faced by industry, government, or nonprofit-sector organizations, broadening students' view of stakeholders and impact, shaping the very questions they raise and answer.
- **Equip students for a lifetime with the cultural agility, creativity, and professional skills**—public speaking and communications, meeting goals and expectations (e.g., project management for personal and professional purposes), teamwork, leadership, peer influence, leading from the middle—that they will need to translate their findings into impactful solutions.
- **Enrich every student's research group and, ultimately, fields of expertise** by fostering a collaborative, entrepreneurial, innovative approach to knowledge creation that expands their network far beyond academia to include intellectual and professional mentors and collaborators.

This graduate certificate designed for PhD students across all of Northeastern's research-based PhD programs provides students embarking on an experiential PhD, as well as postdoctoral researchers working in an area within one of Northeastern's research-based programs, with the preparation, project delivery, and guidance for contextual integration within the context of leadership development. All students pursuing this leadership certificate will be mentored by their sponsor supervisor and dissertation advisor(s).

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B or higher is required in each course.

Requirements

Code	Title	Hours
PHDL 7600	Leading Self and Others	4
PHDL 7660	Experiential PhD Challenge Project 1	4
PHDL 7662	Experiential PhD Challenge Project 2	4
PHDL 7666	Contextual Integration	0

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Industry PhD

The Industry PhD is a first-of-its kind research-based doctoral program designed with input from external partners to provide a pathway for full-time master's-level employees. Designed with input from external partners, employees pursue a research-based doctoral degree while maintaining their job and conducting research at the employer site. This enables employees to acquire new skills that will help them to advance in their careers and provides the organization with an opportunity to invest in their future leaders. By working closely with Northeastern University faculty, employees will explore their research from a broader scientific perspective, enabling them to appreciate the research foundation of their day-to-day work and to pursue new areas of research for the company.

Experiential PhD programs offer robust benefits to both students and institutional partners. Students solve complex problems as part of their education and chart careers as future innovators. Our institutional partners receive many benefits as well, including:

- A deeper engagement in rapidly evolving fields of research
- Access to university facilities and senior faculty expertise
- Opportunities for senior leadership to mentor and copublish with students and to serve on their dissertation committees
- A chance to recruit emerging talent
- Opportunities to partner with Northeastern, an entrepreneurial research university known for its innovative collaborations with academia, government, and industry

The Industry PhD is applicable to any of our 35 doctoral programs. Applicants should follow the requirements of the program to which they are applying. In addition, the following Industry PhD terms (<https://phd.northeastern.edu/industry-and-experiential-phd-program/>) apply.

Interdisciplinary, PhD (Boston)

Offering an individually tailored program of study, the Northeastern University Interdisciplinary Doctor of Philosophy program enables students to draw from the disciplines supporting their fields of research and provides flexibility to train the next generation of transdisciplinary and multidisciplinary researchers who will be needed to tackle society's most pressing problems that cross disciplinary boundaries.

The graduate group, consisting of faculty from across Northeastern, provides the overarching faculty oversight to the curriculum that is expected to cross multiple Northeastern colleges. The Interdisciplinary PhD option will only be available when the desired research curriculum cannot be supported by one of Northeastern's existing PhD programs. This PhD program is administered by the Office of the Provost.

Minimum academic standards, oversight, requirements, and milestones related to this new PhD are described below.

Graduate Group

This refers to the faculty committee that will provide academic oversight for the PhD program as a whole.

Dissertation Committee

Established by the graduate group for each PhD student, the dissertation committee consists of at least three faculty qualified to supervise the student's research and establishes the curriculum requirements in support of the PhD student's anticipated dissertation research. There should be at least one dissertation committee member representing each discipline associated with the proposed PhD, and it is strongly encouraged that an external individual is added as a fourth member of the dissertation committee. This external member must be qualified to supervise and guide PhD-level research. The dissertation committee also establishes the milestone requirements, specifically the format for the qualifying exam at the time of admission. One member of the dissertation committee will serve as the committee chair. Cochairs are permitted and encouraged to guide research at the intersection of disciplines.

Area of Specialization

Students select an area of specialization, supported by their approved coursework and research areas and denoted on the student's transcript. The area of specialization will be recommended by the dissertation committee. The graduate group will review these areas of specialization within the context of existing PhD specializations. The graduate group will make the final decision about the area of specialization for each student. Area of specialization should be established by the end of the first year of academic study.

Admission to Candidacy

The admission to candidacy recognizes the wide range of disciplines that may participate in in this degree. To reach candidacy, PhD students must demonstrate their research ability through the application and synthesis of skills and knowledge and their ability to pose questions and solve problems. Students should achieve candidacy by the end of the second year of study. The admission to candidacy will include an assessment about the candidate's ability to perform societally impactful research by an external evaluator. Students who require more than 18 months to meet the requirements for candidacy will need to petition the dissertation committee and the graduate group to request extended time. Candidacy will be achieved with the following:

- The qualifying examination subject areas will be established at the time of admission, which will be aligned with the student's proposed research project. A representative from the graduate group will convene the dissertation committee for the qualifying exams. To assess the student's ability to perform impactful research, it is strongly recommended that an evaluator outside Northeastern (and not a member of the dissertation committee) be included as an examiner. The qualifying examination will normally include a written exam, oral exam, response to a journal paper, and/or other format deemed acceptable by the dissertation committee for the involved disciplinary areas.
- Progression to candidacy may also require a research paper requirement. Any paper requirements will be communicated at admission.
- The committee may require a presentation from the student before making its recommendation.

Dissertation Prospectus/Proposal

After the student has achieved sufficient depth in a field of study, the student prepares a proposal for a PhD dissertation. This process should take place within a year of achieving candidacy. The dissertation proposal describes the proposed research, including the relevant background materials from literature. The proposal should clearly specify the research questions to be addressed, the methods to be used, and a schedule of milestones to completion. A representative from the graduate group will convene the dissertation committee for the dissertation proposal. The dissertation proposal must be approved by the dissertation committee. It is strongly encouraged that the dissertation committee include an individual qualified to guide the research from outside Northeastern. Upon approval of the written proposal, the student must present the proposed work orally in a public forum, followed by a closed-door oral examination from the dissertation committee. The dissertation committee will submit the dissertation proposal results to the representative from the graduate group who will review and communicate the results to the student. The student may take the dissertation proposal examination twice, at most.

Dissertation Defense

The dissertation defense is held in accordance with the bylaws of the University Graduate Curriculum Committee of the Northeastern Faculty Senate. The defense is convened by a representative from the graduate group and is chaired by a Northeastern faculty member approved by the graduate group and outside the dissertation committee. The dissertation committee will include an external examiner who is an individual with expertise in the area of study but not affiliated with the Northeastern global campus system or previously involved with the student's research. The defense chair will communicate the results to the PhD candidate.

Program Requirements

Program Requirements for Bachelor's Degree Entry

Milestones

Core requirements (*curricula established by the dissertation committee*)

Annual progress review

Admission to candidacy

Qualifying examination

Dissertation prospectus/proposal

Dissertation defense

Core Requirements

Code	Title	Hours
	Complete 30 semester hours of coursework in consultation with your dissertation committee.	30

The dissertation committee will provide oversight in coursework selection, provided that each student has training (via courses or experience) in prerequisite domain knowledge, research methods, and specific contexts. Students are required to enroll in a minimum of 30 semester hours of coursework approved by the dissertation committee. This coursework may include traditional courses, special topics courses, independent study, and discussant or other coursework taken via partner institution. The coursework should also include opportunities to develop the professional skills (such as communication, teaching, and leadership) required for the student's field of research. Courses delivered at a partner outside Northeastern University may satisfy these course requirements provided an education or experiential PhD agreement exists with that organization. The dissertation committee will ensure that the 30 semester hours represent a balance of coursework across domain knowledge, research methods, application contexts, research

integrity, colloquia, the research itself, and professional development. The dissertation committee should submit a plan of study to the graduate group during the first semester of a PhD student's enrollment.

Program Credit / GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements

Program Requirements for Master's Degree Entry

Milestones

Core requirements (*curricula established by the dissertation committee*)

Annual progress review

Admission to candidacy

Qualifying examination

Dissertation prospectus/proposal

Dissertation defense

Core Requirements

Code	Title	Hours
Complete 12 semester hours of coursework in consultation with your dissertation committee.		12

The dissertation committee will provide oversight in coursework selection, provided that each student has training (via courses or experience) in prerequisite domain knowledge, research methods, and specific contexts. Students are required to enroll in a minimum of 12 semester hours of coursework approved by the dissertation committee. This coursework may include traditional courses, special topics courses, independent study, and discussant or other coursework taken via partner institution. The coursework should also include opportunities to develop the professional skills (such as communication, teaching, and leadership) required for the student's field of research. Courses delivered at a partner outside Northeastern University may satisfy these course requirements provided an education or experiential PhD agreement exists with that organization. The dissertation committee will ensure that the 12 semester hours represent a balance of coursework across domain knowledge, research methods, application contexts, research integrity, colloquia, the research itself, and professional development. The dissertation committee should submit a plan of study to the graduate group during the first semester of a PhD student's enrollment.

Program Credit / GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Interdisciplinary, PhD (Portland)

Offering an individually tailored program of study, the Northeastern University Interdisciplinary Doctor of Philosophy program enables students to draw from the disciplines supporting their fields of research and provides flexibility to train the next generation of transdisciplinary and multidisciplinary researchers who will be needed to tackle society's most pressing problems that cross disciplinary boundaries.

The graduate group, consisting of faculty from across Northeastern, provides the overarching faculty oversight to the curriculum that is expected to cross multiple Northeastern colleges. The Interdisciplinary PhD option will only be available when the desired research curriculum cannot be supported by one of Northeastern's existing PhD programs. This PhD program is administered by the Office of the Provost.

Minimum academic standards, oversight, requirements, and milestones related to this new PhD are described below.

Graduate Group

This refers to the faculty committee that will provide academic oversight for the PhD program as a whole.

Dissertation Committee

Established by the graduate group for each PhD student, the dissertation committee consists of at least three faculty qualified to supervise the student's research and establishes the curriculum requirements in support of the PhD student's anticipated dissertation research. There should be at least one dissertation committee member representing each discipline associated with the proposed PhD, and it is strongly encouraged that an external individual is added as a fourth member of the dissertation committee. This external member must be qualified to supervise and guide PhD-level research. The dissertation committee also establishes the milestone requirements, specifically the format for the qualifying exam at the time of admission. One member of the dissertation committee will serve as the committee chair. Cochairs are permitted and encouraged to guide research at the intersection of disciplines.

Area of Specialization

Students select an area of specialization, supported by their approved coursework and research areas and denoted on the student's transcript. The area of specialization will be recommended by the dissertation committee. The graduate group will review these areas of specialization within the

context of existing PhD specializations. The graduate group will make the final decision about the area of specialization for each student. Area of specialization should be established by the end of the first year of academic study.

Admission to Candidacy

The admission to candidacy recognizes the wide range of disciplines that may participate in this degree. To reach candidacy, PhD students must demonstrate their research ability through the application and synthesis of skills and knowledge and their ability to pose questions and solve problems. Students should achieve candidacy by the end of the second year of study. The admission to candidacy will include an assessment about the candidate's ability to perform societally impactful research by an external evaluator. Students who require more than 18 months to meet the requirements for candidacy will need to petition the dissertation committee and the graduate group to request extended time. Candidacy will be achieved with the following:

- The qualifying examination subject areas will be established at the time of admission, which will be aligned with the student's proposed research project. A representative from the graduate group will convene the dissertation committee for the qualifying exams. To assess the student's ability to perform impactful research, it is strongly recommended that an evaluator outside Northeastern (and not a member of the dissertation committee) be included as an examiner. The qualifying examination will normally include a written exam, oral exam, response to a journal paper, and/or other format deemed acceptable by the dissertation committee for the involved disciplinary areas.
- Progression to candidacy may also require a research paper requirement. Any paper requirements will be communicated at admission.
- The committee may require a presentation from the student before making its recommendation.

Dissertation Prospectus/Proposal

After the student has achieved sufficient depth in a field of study, the student prepares a proposal for a PhD dissertation. This process should take place within a year of achieving candidacy. The dissertation proposal describes the proposed research, including the relevant background materials from literature. The proposal should clearly specify the research questions to be addressed, the methods to be used, and a schedule of milestones to completion. A representative from the graduate group will convene the dissertation committee for the dissertation proposal. The dissertation proposal must be approved by the dissertation committee. It is strongly encouraged that the dissertation committee include an individual qualified to guide the research from outside Northeastern. Upon approval of the written proposal, the student must present the proposed work orally in a public forum, followed by a closed-door oral examination from the dissertation committee. The dissertation committee will submit the dissertation proposal results to the representative from the graduate group who will review and communicate the results to the student. The student may take the dissertation proposal examination twice, at most.

Dissertation Defense

The dissertation defense is held in accordance with the bylaws of the University Graduate Curriculum Committee of the Northeastern Faculty Senate. The defense is convened by a representative from the graduate group and is chaired by a Northeastern faculty member approved by the graduate group and outside the dissertation committee. The dissertation committee will include an external examiner who is an individual with expertise in the area of study but not affiliated with the Northeastern global campus system or previously involved with the student's research. The defense chair will communicate the results to the PhD candidate.

Program Requirements

Program Requirements for Bachelor's Degree Entry

Milestones

Core requirements (*curricula established by the dissertation committee*)

Annual progress review
Admission to candidacy
Qualifying examination
Dissertation prospectus/proposal
Dissertation defense

Core Requirements

Code	Title	Hours
	Complete 30 semester hours of coursework in consultation with your dissertation committee.	30

The dissertation committee will provide oversight in coursework selection, provided that each student has training (via courses or experience) in prerequisite domain knowledge, research methods, and specific contexts. Students are required to enroll in a minimum of 30 semester hours of coursework approved by the dissertation committee. This coursework may include traditional courses, special topics courses, independent study, and discussion or other coursework taken via partner institution. The coursework should also include opportunities to develop the professional skills (such as communication, teaching, and leadership) required for the student's field of research. Courses delivered at a partner outside Northeastern University may satisfy these course requirements provided an education or experiential PhD agreement exists with that organization. The dissertation committee will ensure that the 30 semester hours represent a balance of coursework across domain knowledge, research methods, application contexts, research integrity, colloquia, the research itself, and professional development. The dissertation committee should submit a plan of study to the graduate group during the first semester of a PhD student's enrollment.

Program Credit / GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements
Program Requirements for Master's Degree Entry
Milestones

- Core requirements *(curricula established by the dissertation committee)*
- Annual progress review
 - Admission to candidacy
 - Qualifying examination
 - Dissertation prospectus/proposal
 - Dissertation defense

Core Requirements

Code	Title	Hours
Complete 12 semester hours of coursework in consultation with your dissertation committee.		12

The dissertation committee will provide oversight in coursework selection, provided that each student has training (via courses or experience) in prerequisite domain knowledge, research methods, and specific contexts. Students are required to enroll in a minimum of 12 semester hours of coursework approved by the dissertation committee. This coursework may include traditional courses, special topics courses, independent study, and discussant or other coursework taken via partner institution. The coursework should also include opportunities to develop the professional skills (such as communication, teaching, and leadership) required for the student's field of research. Courses delivered at a partner outside Northeastern University may satisfy these course requirements provided an education or experiential PhD agreement exists with that organization. The dissertation committee will ensure that the 12 semester hours represent a balance of coursework across domain knowledge, research methods, application contexts, research integrity, colloquia, the research itself, and professional development. The dissertation committee should submit a plan of study to the graduate group during the first semester of a PhD student's enrollment.

Program Credit / GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

University Interdisciplinary Programs

- Artificial Intelligence, MS (Boston) (p. 164)
- Complex Network Analysis, MS (Boston) (p. 166)
- Data Science, MS (Boston) (p. 169)
- Data Science—Align, MS (Boston) (p. 172)
- Extended Realities, MS (Boston) (p. 175)
- Extended Realities, MS (Oakland) (p. 179)
- Robotics, MS (Boston) (p. 180)
- Robotics, MS (Seattle) (p. 184)
- Statistics, MS (Boston) (p. 187)
- Statistics, MS—Connect (Boston) (p. 189)
- AI Applications, Graduate Certificate (Boston) (p. 190)
- AI Applications, Graduate Certificate (Silicon Valley) (p. 191)
- Product Management, Graduate Certificate (Boston) (p. 192)

Artificial Intelligence, MS (Boston)

The Master of Science in Artificial Intelligence provides a comprehensive framework encompassing foundational algorithms, theory, and practical applications in the rapidly evolving field of AI. This program offers students the essential knowledge and skills to design, develop, and implement AI systems across various high-demand sectors. The core curriculum is designed to provide in-depth understanding of fundamental AI concepts, forming a solid foundation for both theoretical and practical aspects of artificial intelligence.

Building on this strong foundation, students can delve into advanced AI applications through interdisciplinary concentrations tailored to industry needs. These concentrations include computer vision, continuous process engineering, machine learning, and robotics and agent-based systems.

The master's in artificial intelligence is an interdisciplinary degree offered by Khoury College of Computer Sciences and the College of Engineering. Descriptions of the concentrations offered in this degree are as follows:

- Computer Vision—College of Engineering
 - The computer vision concentration offers students the knowledge and skills to drive innovation at the intersection of new and emerging vision systems and AI, through utilizing AI and machine learning solutions for a wide range of applications including image enhancement/restoration, object recognition, navigation, graphics rendering, and pattern classification.
- Continuous Process Engineering—College of Engineering
 - The continuous process engineering concentration offers students the knowledge and skills to revolutionize how industrial processes are designed, monitored, and optimized. The program aims to prepare students to utilize AI and machine learning solutions to enhance process efficiency, predictive maintenance, and real-time decision making in industries such as chemicals, pharmaceuticals, and energy. Graduates will be prepared to integrate AI-driven solutions into continuous manufacturing environments to improve safety, sustainability, and productivity.
- Energy Systems—College of Engineering
 - The energy systems concentration offers students the knowledge and skills to drive innovation in sustainable and intelligent energy systems. Students examine how to utilize AI and machine learning solutions to support smart energy grid operations, integrate renewable energy sources, and create responsive and resilient systems.
- Machine Learning—Khoury College of Computer Sciences
 - The goal of the machine learning concentration is to provide students with practical, hands-on experience in designing, implementing, and optimizing machine learning models for real-world applications. The curriculum positions graduates to pursue roles that leverage AI to drive innovation and efficiency in a wide variety of industries and domains.
- Robotics and Agent-Based Systems—Khoury College of Computer Sciences
 - The goal of the robotics and agent-based systems concentration is to provide students with expertise in designing and developing intelligent robotic systems and autonomous agents capable of performing complex tasks in dynamic environments. The curriculum positions graduates to pursue roles that contribute to innovations in automation, human-robot interaction, and intelligent systems design.

Students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their college of admission.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following:

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 5130	Applied Programming and Data Processing for AI	4
DADS 5200	Mathematics for Machine Learning	4
or DS 5020	Introduction to Linear Algebra and Probability for Data Science	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	4
or DADS 7275	Machine Learning and Data Analytics	

Concentrations

Complete one of the following concentrations:

- Computer Vision (p. 165)—College of Engineering
- Continuous Process Engineering (p. 165)—College of Engineering
- Energy Systems (p. 165)—College of Engineering
- Machine Learning (p. 166)—Khoury College of Computer Sciences
- Robotics and Agent-Based Systems (p. 166)—Khoury College of Computer Sciences

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

COMPUTER VISION CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Complete 8 semester hours from the following:		8
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
or ME 5554	Robotics Sensing and Navigation	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
Complete 4 semester hours from the following:		4
EECE 5645	Parallel Processing for Data Analytics	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering	
Capstone		
EECE 7945	Master's Project	4

CONTINUOUS PROCESS ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Students without a chemical engineering degree are advised to choose the 510X courses, which serve as a bridge from other degrees.		
Complete 8 semester hours from the following:		8
CHME 5101 and CHME 5102	Fundamentals of Chemical Engineering: Fluid, Heat, and Mass Transfer and Fundamentals of Chemical Engineering: Thermodynamics and Kinetics	
CHME 5510 and CHME 5515	Fundamentals in Process Safety Engineering and Process Safety Engineering for Biotechnology and Pharmaceutical Industries	
CHME 7600 and CHME 7601	Pharmaceutical Engineering I and Pharmaceutical Engineering II	
Complete 4 semester hours from the following:		4
CHEM 5641 and CHME 7901	Computational Chemistry and Journal Club in Chemical Engineering	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5520	Designing for Process Safety	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
IE 7270	Intelligent Manufacturing	
PHIL 5010	AI Ethics	
PHSC 5900	AI in Drug Discovery and Development	
Capstone		
CHME 6580	Artificial Intelligence for Process Engineering Capstone	4

ENERGY SYSTEMS CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Complete 12 semester hours from the following:		12
CHME 5621	Electrochemical Engineering	
CHME 5692	Carbon Capture, Utilization, and Storage	

ENSY 5000	Fundamentals of Energy System Integration
ENSY 5700	Renewable Energy Development
ENSY 5800	Applications of Artificial Intelligence in Energy Systems
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting
ME 5374	Special Topics in Mechanical Engineering
ME 6200	Mathematical Methods for Mechanical Engineers 1
PHIL 5010	AI Ethics

Capstone

ME 7945	Master's Project	4

MACHINE LEARNING CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
CS 5800	Algorithms	4
Complete 8 semester hours from the following:		8
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	

Capstone

Complete 4 semester hours from the following:		4
CS 6170	AI Capstone	
CS 8674	Master's Project	

ROBOTICS AND AGENT-BASED SYSTEMS CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
CS 5800	Algorithms	4
Complete 8 semester hours from the following:		8
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	

Capstone

Complete 4 semester hours from the following:		4
CS 6170	AI Capstone	
CS 8674	Master's Project	

Complex Network Analysis, MS (Boston)

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master's degree program in complex network analysis methodologies. The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business
4. Biological systems modeling used across research and industry including network biology, drug discovery, or multi-omics mining

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Biological Networks—College of Science
- Complex Social Systems—College of Social Sciences and Humanities
- Economic and Technological Networks—Khoury College of Computer Sciences
- Population Health Dynamics—Bouvé College of Health Sciences

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CNET 5050	Fundamentals of Complex Networks	4
CNET 5051	Analyzing Complex Network Data	4
CNET 5052	Advanced Tools for Complex Network Analysis	4
CNET 5901	Visualizing Complex Networks	2
CNET 5902	Communicating Network Data	2

Concentrations

Complete one of the following concentrations:

- Complex Biological Networks (p. 167)—College of Science
- Complex Social Systems (p. 168)—College of Social Sciences and Humanities
- Economic and Technological Networks (p. 168)—Khoury College of Computer Sciences
- Population Health Dynamics (p. 169)—Bouvé College of Health Sciences

Experiential Courses

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		4
CNET 6107	Complex Network Analysis Research Rotation	
CNET 6108	Complex Network Analysis Capstone	
CNET 6990	Thesis	

Optional Co-op

Code	Title	Hours
CNET 6000	Professional Development for Co-op	1
CNET 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

Minimum 33 total semester hours required

Additional hours may be required based on student choice of courses or concentration.

One semester hour of additional coursework is required for participation in co-op.

Minimum 3.000 GPA required

CONCENTRATION IN COMPLEX BIOLOGICAL NETWORKS—COLLEGE OF SCIENCE

Code	Title	Hours
A minimum of 16 semester hours is required to complete this concentration.		
Required		

CNET 5515	Complex Network Analysis for Biological Systems	4
Complete 8 semester hours from the following:		8
BINF 6308	Bioinformatics Computational Methods 1	
BINF 6310	Introduction to Bioinformatics	
EEMB 5130	Population Dynamics	
ENVR 5450	Applied Social-Ecological Systems Modeling	
MATH 5131	Introduction to Mathematical Methods and Modeling	
MATH 7340	Statistics for Bioinformatics	
PHYS 5211	Introduction to Scientific Computing	
Complete 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5314	Complexity in Social Systems	
CNET 5411	Financial and Economic Networks	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN COMPLEX SOCIAL SYSTEMS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
A minimum of 13 semester hours is required to complete this concentration.		
Required		
CNET 5314	Complexity in Social Systems	3
Complete a minimum of 6 semester hours from the following:		6
CNET 5311	Physical and Digital Human Traces	
CNET 5360	Research Design for Social Networks	
INSH 5301	Introduction to Computational Statistics	
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	
INSH 6300	Research Methods in the Social Sciences	
INSH 6304	Modeling and Analyzing Social Networks	
INSH 6406	Analyzing Complex Digitized Data	
INSH 6500	Statistical Analysis	
PHYS 5211	Introduction to Scientific Computing	
PPUA 5262	Big Data for Cities	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5411	Financial and Economic Networks	
CNET 5515	Complex Network Analysis for Biological Systems	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN ECONOMIC AND TECHNOLOGICAL NETWORKS—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
A minimum of 14 semester hours is required to complete this concentration.		
Required		
CNET 5411	Financial and Economic Networks	3
Complete a minimum of 7 semester hours from the following:		7
CS 7150	Deep Learning	
CS 7200	Statistical Methods for Computer Science	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
MISM 6212	Data Mining and Machine Learning for Business	

PHYS 5211	Introduction to Scientific Computing	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5314	Complexity in Social Systems	
CNET 5515	Complex Network Analysis for Biological Systems	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN POPULATION HEALTH DYNAMICS—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
A minimum of 14 semester hours is required to complete this concentration.		
Required		
CNET 5126	Spreading on Networks: From Epidemics to Memes	4
Complete a minimum of 6 semester hours from the following:		6
BINF 6308	Bioinformatics Computational Methods 1	
PHTH 5210	Biostatistics in Public Health	
PHTH 6210	Applied Regression Analysis	
PHTH 6224	Social Epidemiology	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6800	Causal Inference in Public Health Research	
PHTH 6801	Causal Inference 1	
PHYS 5211	Introduction to Scientific Computing	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5314	Complexity in Social Systems	
CNET 5411	Financial and Economic Networks	
CNET 5515	Complex Network Analysis for Biological Systems	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

Data Science, MS (Boston)

Khoury College of Computer Sciences and the College of Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science—Align fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Engineering Theory and Modeling—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 113).

Data Science Core

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Programming with Data		
DS 5110	Essentials of Data Science	4
Algorithms		
CS 5800 or EECE 7205	Algorithms Fundamentals of Computer Engineering	4
Machine Learning		
CS 6140 or EECE 5644	Machine Learning Introduction to Machine Learning and Pattern Recognition	4
Interdisciplinary Capstone		
DS 5500	Data Science Capstone	4

Data Science Concentration Options

Complete one of the following concentrations:

- Computer Science (p. 170)—Khoury College of Computer Sciences
- Engineering Theory and Modeling (p.)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Complete 16 semester hours from the following: ¹		16
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7250	Information Visualization: Theory and Applications	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
CS 7990	Thesis	
CS 8674	Master's Project	
DS 7995	Project	

ENGINEERING THEORY AND MODELING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Foundational Courses		
Complete 4 semester hours from the following: ¹		4
DS 7995	Project	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7346	Probabilistic System Modeling and Analysis	
IE 6400	Foundations for Data Analytics Engineering	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
Translational and Advanced Courses		
Complete the remaining 12 semester hours from the following:		12
BIOE 5750	Modeling and Inference in Bioengineering	
BIOE 5880	Computational Methods in Systems Bioengineering	
BIOE 6200	Mathematical Methods in Bioengineering	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5645	Parallel Processing for Data Analytics	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7215	Introduction to Distributed Intelligence	
EECE 7223	Riemannian Optimization	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7945	Master's Project	
IE 5137	Computational Modeling in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	
IE 5630	Biosensor and Human Behavior Measurement	
IE 5640	Data Mining for Engineering Applications	
IE 6400	Foundations for Data Analytics Engineering	
IE 6600	Computation and Visualization for Analytics	
IE 6700	Data Management for Analytics	
IE 6750	Data Warehousing and Integration	
IE 7270	Intelligent Manufacturing	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7295	Applied Reinforcement Learning in Engineering	
IE 7300	Statistical Learning for Engineering	

IE 7500	Applied Natural Language Processing in Engineering
IE 7615	Neural Networks and Deep Learning

- ¹ Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional hour, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Data Science, MS—Align (Boston)

Khoury College of Computer Sciences and the College of Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science—Align fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

The Master of Science in Data Science—Align curriculum is specifically designed to prepare incoming students without any prior programming experience. During the first semester of year one, students are expected to take foundational courses in computer science fundamentals, as well as a course in data structures/discrete mathematics. During their second semester, students will take coursework in programming for data science, as well as linear algebra and probability.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Engineering Theory and Modeling—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 113).

Align Bridge Coursework

Students are required to complete all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Programming for Data Science		
DS 5010	Introduction to Programming for Data Science	4
Additional Align Coursework		
DS 5020	Introduction to Linear Algebra and Probability for Data Science	4

Data Science Core

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Programming with Data		
DS 5110	Essentials of Data Science	4
Algorithms		

CS 5800	Algorithms	4
or EECE 7205	Fundamentals of Computer Engineering	
Machine Learning		
CS 6140	Machine Learning	4
or EECE 5644	Introduction to Machine Learning and Pattern Recognition	
Interdisciplinary Capstone		
DS 5500	Data Science Capstone	4

Data Science Concentration Options

Complete one of the following concentrations:

- Computer Science (p. 173)—Khoury College of Computer Sciences
- Engineering Theory and Modeling (p.)—College of Engineering

Program Credit/GPA Requirements

40–48 total semester hours required

Minimum 3.000 GPA required

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Complete 16 semester hours from the following: ¹		16
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7250	Information Visualization: Theory and Applications	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
CS 7990	Thesis	
CS 8674	Master's Project	
DS 7995	Project	

ENGINEERING THEORY AND MODELING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Foundational Courses		
Complete 4 semester hours from the following: ¹		4
DS 7995	Project	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	

EECE 7346	Probabilistic System Modeling and Analysis
IE 6400	Foundations for Data Analytics Engineering
IE 7275	Data Mining in Engineering
IE 7280	Statistical Methods in Engineering
Translational and Advanced Courses	
Complete the remaining 12 semester hours from the following:	
BIOE 5750	Modeling and Inference in Bioengineering
BIOE 5880	Computational Methods in Systems Bioengineering
BIOE 6200	Mathematical Methods in Bioengineering
CHME 5137	Computational Modeling in Chemical Engineering
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences
CIVE 7100	Time Series and Geospatial Data Sciences
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering
EECE 5360	Combinatorial Optimization
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty
EECE 5626	Image Processing and Pattern Recognition
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5642	Data Visualization
EECE 5645	Parallel Processing for Data Analytics
EECE 7204	Applied Probability and Stochastic Processes
EECE 7215	Introduction to Distributed Intelligence
EECE 7223	Riemannian Optimization
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
EECE 7945	Master's Project
IE 5137	Computational Modeling in Industrial Engineering
IE 5390	Structured Data Analytics for Industrial Engineering
IE 5630	Biosensor and Human Behavior Measurement
IE 5640	Data Mining for Engineering Applications
IE 6400	Foundations for Data Analytics Engineering
IE 6600	Computation and Visualization for Analytics
IE 6700	Data Management for Analytics
IE 6750	Data Warehousing and Integration
IE 7270	Intelligent Manufacturing
IE 7275	Data Mining in Engineering
IE 7280	Statistical Methods in Engineering
IE 7295	Applied Reinforcement Learning in Engineering
IE 7300	Statistical Learning for Engineering
IE 7500	Applied Natural Language Processing in Engineering
IE 7615	Neural Networks and Deep Learning

¹ Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional 1 semester hour, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Extended Realities, MS (Boston)

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality.

This program is structured to allow students flexibility and specialization to choose a path that matches their interest. Students have an opportunity to focus on a concentration area that matches their professional background and aspirations.

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their home college. The concentrations are associated with the following colleges:

- Khoury College of Computer Sciences
 - Artificial Intelligence
 - Human Computer Interaction
- D'Amore-McKim School of Business
 - Entrepreneurship
 - Marketing
- Bouvé College of Health Sciences
 - Human Movement Science
- College of Social Sciences and Humanities
 - Information Ethics
 - Public History
- College of Engineering
 - Wireless Networking
- College of Arts, Media and Design
 - XR and Design
 - XR and Games
 - XR and Media

The Master of Science in Extended Realities welcomes students from a diverse range of backgrounds because of the applications of XR technology used in many disciplines and industries including medicine, business, entertainment, architecture, and journalism.

Some concentrations may require a technical background and are noted in the requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Extended Reality Core

Code	Title	Hours
Required Courses		
EXRE 5010 and EXRE 5011	Immersive Media: Extended Realities (XR) History, Theory, and Impact and Seminar for EXRE 5010	5
EXRE 5020	Developing Extended Realities (XR)	4
EXRE 5030	Designing Extended Realities (XR)	4
EXRE 7500 or EXRE 7990	Extended Realities (XR) Project Thesis	4
GSND 5122	Business Models in the Game Industry	1

Extended Reality Concentration Options

Complete one of the following options:

- Artificial Intelligence (p. 176)—Khoury College of Computer Sciences
- Entrepreneurship (p. 176)—D'Amore-McKim School of Business
- Human Computer Interaction (p. 176)—Khoury College of Computer Sciences
- Human Movement Science (p. 176)—Bouvé College of Health Sciences
- Information Ethics (p. 177)—College of Social Sciences and Humanities
- Marketing (p. 177)—D'Amore-McKim School of Business
- Public History (p. 177)—College of Social Sciences and Humanities
- Wireless Networking (p. 178)—College of Engineering

- XR and Design (p. 178)—College of Arts, Media and Design
- XR and Games (p. 178)—College of Arts, Media and Design
- XR and Media (p. 178)—College of Arts, Media and Design

Program Credit/GPA Requirements

34 total semester hours required. Some concentrations may require more than 34 semester hours to complete.

Minimum 3.000 GPA required

CONCENTRATION IN ARTIFICIAL INTELLIGENCE—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Requires a background in computer science.		
CS 5097	Mixed Reality	4
CS 5100	Foundations of Artificial Intelligence	4
CS 6120	Natural Language Processing	4
CS 6140	Machine Learning	4
or DS 5220	Supervised Machine Learning and Learning Theory	

CONCENTRATION IN ENTREPRENEURSHIP—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
INNO 6200	Enterprise Growth and Innovation	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
GE 5030	Iterative Product Prototyping for Engineers	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

CONCENTRATION IN HUMAN COMPUTER INTERACTION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Required Courses		
CS 5340	Computer/Human Interaction	4
Electives		
Complete 12 semester hours from the following:		12
ARTG 5710	Design for Dignity	
CS 5097	Mixed Reality	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 6350	Empirical Research Methods	
CS 7390	Special Topics in Human-Centered Computing	
GSND 6340	Biometrics of Design	

CONCENTRATION IN HUMAN MOVEMENT SCIENCE—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
Required Courses		
GSND 6340	Biometrics of Design	4
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4

Electives

Complete 7–8 semester hours from the following:		7-8
PT 5133	Kinesiology	
PT 5150	Motor Control, Development, and Learning	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 5410	Functional Human Neuroanatomy	
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	
PT 7020	Technologies in Movement and Rehabilitation Science	

CONCENTRATION IN INFORMATION ETHICS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

Electives

Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MARKETING—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

CONCENTRATION IN PUBLIC HISTORY—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
HIST 5237	Issues and Methods in Public History	4
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1 (to be taken twice)	
Electives		
Complete 8 semester hours from the following:		8
HIST 5241	Exhibits and Museums	
HIST 7250	Topics in Public History (Public History and Slavery)	
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)	

CONCENTRATION IN WIRELESS NETWORKING—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
EECE 5512	Networked XR Systems	
EECE 7374	Fundamentals of Computer Networks	
Electives		
Complete 8 semester hours from the following:		8
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	

CONCENTRATION IN XR AND DESIGN—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5640	Prototyping for Experience Design	4
EXRE 6500	Extended Realities (XR) Studio	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN XR AND GAMES—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
Electives		
Complete 8 semester hours from the following:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6001	Advanced Topics in Game Science	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6330	Player Experience	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	
GSND 6460	Generative Game Design	

CONCENTRATION IN XR AND MEDIA—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	

JRNL 5311	Design for Storytelling
JRNL 6305	Topics
JRNL 6341	Telling Your Story with Data

Plan of Study

Sample Plan of Study

The following is a sample plan of study for a student in the Concentration in XR and Games.

Year 1			
Fall	Hours	Spring	Hours
EXRE 5010 and EXRE 5011		5 EXRE 5030	4
EXRE 5020		4 GSND 5110 and GSND 5111	5
		9	9
Year 2			
Fall	Hours	Spring	Hours
EXRE 6500		4 EXRE 7500	4
GSND 5122		1 XR and games elective 2	4
XR and games elective 1		4	
		9	8
Total Hours: 35			

Extended Realities, MS (Oakland)

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities (XR) to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality.

In this degree program, students are admitted to the College of Arts, Media and Design and their degree is awarded by that college. Students will follow all policies associated with the College of Arts, Media and Design.

The Master of Science in Extended Realities welcomes students from a diverse range of backgrounds because of the applications of XR technology used in many disciplines and industries, including medicine, business, entertainment, architecture, and journalism.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Extended Realities Core

Code	Title	Hours
Required Courses		
EXRE 5010 and EXRE 5011	Immersive Media: Extended Realities (XR) History, Theory, and Impact and Seminar for EXRE 5010	5
EXRE 5020	Developing Extended Realities (XR)	4
EXRE 5030	Designing Extended Realities (XR)	4
EXRE 7500 or EXRE 7990	Extended Realities (XR) Project Thesis	4
GSND 5122	Business Models in the Game Industry	1

Concentration in XR and Games—College of Arts, Media and Design

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
Electives		
Complete 8 semester hours from the following:		8
GSND 6000	Advanced Topics in Game Design	

GSND 6001	Advanced Topics in Game Science
GSND 6240	Exploratory Concept Design
GSND 6250	Spatial and Temporal Design
GSND 6330	Player Experience
GSND 6340	Biometrics of Design
GSND 6350	Data-Driven Game Design
GSND 6460	Generative Game Design

Program Credit/GPA Requirements

35 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Sample Plan of Study

CONCENTRATION IN XR AND GAMES—COLLEGE OF ARTS, MEDIA AND DESIGN

Year 1			
Fall	Hours	Spring	Hours
EXRE 5010 and EXRE 5011		5 EXRE 5030	4
EXRE 5020		4 GSND 5110 and GSND 5111	5
		9	9
Year 2			
Fall	Hours	Spring	Hours
EXRE 6500		4 EXRE 7500	4
GSND 5122		1 XR and Games Elective 2	4
XR and Games Elective 1		4	
		9	8
Total Hours: 35			

Robotics, MS (Boston)

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics offers instruction by the faculty of the College of Engineering, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences. The program is designed to provide students with comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Biomedical and Rehabilitation Robotics—College of Engineering
- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

Gordon Institute of Engineering Leadership

Master's Degree in Robotics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Robotics in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved robotics technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the certificate coursework may be applied to this program's elective requirements in the coursework option.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Electrical and Computer Engineering		
Complete one of the following:		4
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Computer Science		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

Concentrations

Complete one of the following options:

- Biomedical and Rehabilitation Robotics (p. 181)—College of Engineering
- Computer Science (p. 182)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 182)—College of Engineering
- Mechanical Engineering (p. 183)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required (33 total semester hours with participation in co-op in certain concentrations)

Minimum 3.000 GPA required

BIOMEDICAL AND REHABILITATION ROBOTICS CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
Complete one of the following:		4
BIOE 5520	Bioengineering Design for Robotic Rehabilitation	
PT 5170 and PT 5171	Motor Control and Lab for PT 5170	
PT 5321	Applications of Biomechanics in Human Function and Movement	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 183)		
<i>Project Option</i>		
Students working with Department of Physical Therapy, Movement, and Rehabilitation Sciences faculty should enroll in the PT course. Students working with Department of Bioengineering faculty should choose the BIOE course.		
BIOE 7945 or PT 7995	Master's Project Master's Project	
Complete 12 semester hours of courses from the elective course list. (p. 183)		
<i>Thesis Option</i>		
Students working with Department of Physical Therapy, Movement, and Rehabilitation Sciences faculty should enroll in the PT course. Students working with Department of Bioengineering faculty should choose the BIOE course.		
BIOE 7945 or PT 7995	Master's Project Master's Project	
BIOE 7990 or PT 7990	Thesis Thesis	

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

Complete the following (students must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours

Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.

Required Course

Complete one additional CS course not used to fulfill the core requirements: 4

CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

Options

Complete one of the following options: 16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

CS 8674 Master's Project

Complete 12 semester hours of courses from the elective course list. (p. 183)

Thesis Option

CS 7990 Thesis

CS 8674 Master's Project

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

For students in the this concentration, please consult your academic advisor for co-op procedures.

ELECTRICAL AND COMPUTER ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours

Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional EECE course not used to fulfill the core requirements: 4

EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	

Options

Complete one of the following options: 16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

EECE 7945 Master's Project

Complete 12 semester hours of courses from the elective course list. (p. 183)

Thesis Option

EECE 7945 Master's Project

EECE 7990 Thesis

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

Complete the following (students must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1

ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

MECHANICAL ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours

Students in the mechanical engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional ME course not used to fulfill the core requirements:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	

Options

Complete one of the following options:		16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

ME 7945 Master's Project

Complete 12 semester hours of courses from the elective course list. (p. 183)

Thesis Option

ME 7945 Master's Project

ME 7990 Thesis

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

Complete the following (students must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Elective Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	

EECE 5554	Robotics Sensing and Navigation
EECE 5580	Classical Control Systems
EECE 5639	Computer Vision
EECE 5642	Data Visualization
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7150	Autonomous Field Robotics
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
IE 6500	Human Performance
IE 7280	Statistical Methods in Engineering
IE 7315	Human Factors Engineering
IE 7615	Neural Networks and Deep Learning
ME 5240	Computer Aided Design and Manufacturing
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6250	Wearable Robotics
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7247	Advanced Control Engineering
PT 5170	Motor Control
PT 5321	Applications of Biomechanics in Human Function and Movement
PT 7001	Core Concepts in Rehabilitation Science and Research
PT 7005	Experimental Design and Applied Statistics
PT 7020	Technologies in Movement and Rehabilitation Science

Robotics, MS (Seattle)

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics is offered by the College of Engineering and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	

Electrical and Computer Engineering

Complete one of the following:	4
EECE 5550	Mobile Robotics
EECE 5552	Assistive Robotics
EECE 5554	Robotics Sensing and Navigation

Computer Science

Complete one of the following:	4
CS 5180	Reinforcement Learning and Sequential Decision Making
CS 5335	Robotic Science and Systems

Concentrations

Complete one of the following concentrations:

- Computer Science (p. 185)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 185)—College of Engineering
- Mechanical Engineering (p. 186)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required (33 total semester hours with participation in co-op in certain concentrations)

Minimum 3.000 GPA required

CONCENTRATION IN COMPUTER SCIENCE

Code	Title	Hours
Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.		
Required Course		
Complete one additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p.)		
<i>Project Option</i>		
CS 8674	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p.)		
<i>Thesis Option</i>		
CS 8674	Master's Project	
CS 7990	Thesis	
Complete 8 semester hours of courses from the elective course list. (p.)		

Optional Co-op

For students in the this concentration, please consult your academic advisor for co-op procedures.

CONCENTRATION IN ELECTRICAL AND COMPUTER ENGINEERING

Code	Title	Hours
Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.		
Required Course		
Complete one additional EECE course not used to fulfill the core requirements:		4
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p.)		
<i>Project Option</i>		
EECE 7945	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p.)		

Thesis Option

EECE 7945	Master's Project	
EECE 7990	Thesis	
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
Complete 8 semester hours of courses from the elective course list. (p.)		

Optional Co-op

Complete the following (students in EECE and MIE concentrations must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

CONCENTRATION IN MECHANICAL ENGINEERING

Code	Title	Hours

Students in the mechanical engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional ME course not used to fulfill the core requirements: 4

ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	

Complete one of the following options: 16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p.)

Project Option

ME 7945	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p.)		

Thesis Option

ME 7945	Master's Project	
ME 7990	Thesis	

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p.)

Optional Co-op

Complete the following (students in EECE and MIE concentrations must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Elective Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	

CS 7140	Advanced Machine Learning
CS 7150	Deep Learning
CS 7180	Special Topics in Artificial Intelligence
DS 5220	Supervised Machine Learning and Learning Theory
EECE 5550	Mobile Robotics
EECE 5552	Assistive Robotics
EECE 5554	Robotics Sensing and Navigation
EECE 5580	Classical Control Systems
EECE 5639	Computer Vision
EECE 5642	Data Visualization
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7150	Autonomous Field Robotics
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
IE 6500	Human Performance
IE 7280	Statistical Methods in Engineering
IE 7315	Human Factors Engineering
IE 7615	Neural Networks and Deep Learning
ME 5240	Computer Aided Design and Manufacturing
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7247	Advanced Control Engineering

Statistics, MS (Boston)

The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The Master of Science in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical machine learning—Khoury College of Computer Sciences
- Statistical theory and modeling—College of Science

Students will follow all policies associated with their home college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800	Causal Inference in Public Health Research	3-4
or PHTH 6801	Causal Inference 1	
PHTH 6830	Generalized Linear Models	4

Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 188)—Bouvé College of Health Sciences
- Statistical Machine Learning (p. 188)—Khoury College of Computer Sciences
- Statistical Theory and Modeling (p. 188)—College of Science

Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses may be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

Program Credit/GPA Requirements

31 total semester hours required (32 for students who declare the Concentration in Statistical Theory and Modeling and also opt to participate in co-op)

Minimum 3.000 GPA required

CONCENTRATION IN BIOSTATISTICS (BOUVÉ COLLEGE OF HEALTH SCIENCES)

Code	Title	Hours
Complete 12 semester hours from the following:		12
PHTH 5350	Using SAS in Public Health Research	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	
Optional Co-op		
HLTH 6964	Co-op Work Experience	0

CONCENTRATION IN STATISTICAL MACHINE LEARNING (KHOURY COLLEGE OF COMPUTER SCIENCES)

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Essentials of Data Science	4
Optional Co-op		
CS 6964	Co-op Work Experience	0

CONCENTRATION IN STATISTICAL THEORY AND MODELING (COLLEGE OF SCIENCE)

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

Optional Co-op

EESC 6500	Pathways to Professional Success	1
EESC 6964	Co-op Work Experience	0

Statistics, MS—Connect (Boston)

The Master of Science in Statistics—Connect program is designed for students from all backgrounds with a BS/BA degree, provided the student has experience with basic calculus and statistics. The first semester of the degree program provides students with the foundational knowledge needed to study successfully alongside direct-entry graduate students. The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The MS in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouv  College of Health Sciences
- Statistical Machine Learning—Khoury College of Computer Sciences
- Statistical Theory and Modeling—College of Science

Students will follow all policies associated with their college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Connect Courses

Code	Title	Hours
Students are required to complete 8–10 semester hours from the following unless otherwise determined by the program:		8-10
CS 5001	Intensive Foundations of Computer Science	
MATH 5001	Accelerated Linear Algebra	
MATH 5002	Accelerated Multivariable Calculus	
MATH 5003	Accelerated Probability and Statistics	
MATH 5110	Applied Linear Algebra and Matrix Analysis	

Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800	Causal Inference in Public Health Research	3-4
or PHTH 6801	Causal Inference 1	
PHTH 6830	Generalized Linear Models	4

Concentrations

Complete one of the following concentrations:

- Biostatistics—Bouv  College of Health Sciences (p. 190)
- Statistical Machine Learning—Khoury College of Computer Sciences (p. 190)
- Statistical Theory and Modeling—College of Science (p. 190)

Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses can be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

Program Credit/GPA Requirements

39-41 total semester hours required (40-42 for students who declare the Concentration in Statistical Theory and Modeling and also opt to participate in co-op)

Minimum 3.000 GPA required

BIostatistics Concentration—Bouv  College of Health Sciences

Code	Title	Hours
Complete 12 semester hours from the following:		12
PHTH 5350	Using SAS in Public Health Research	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	
Optional Co-op		
HLTH 6964	Co-op Work Experience	0

Statistical Machine Learning Concentration—Khouri College of Computer Sciences

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Essentials of Data Science	4
Optional Co-op		
CS 6964	Co-op Work Experience	0

Statistical Theory and Modeling Concentration—College of Science

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
Optional Co-op		
EESC 6500	Pathways to Professional Success	1
EESC 6964	Co-op Work Experience	0

AI Applications, Graduate Certificate (Boston)

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- College of Social Sciences and Humanities
- D'Amore-McKim School of Business
- Mills College at Northeastern

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

Experiential Courses

Code	Title	Hours
Complete 4 semester hours from the following:		4
CRIM 6600	Justice, Technology, and AI	
EDUT 6150	AI in Education	
HLTH 5800	AI Across the Health Sciences	
IE 5640	Data Mining for Engineering Applications	
JRNL 6460	AI in Media Industries	
MISM 6250	Strategic AI for Business	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

AI Applications, Graduate Certificate (Silicon Valley)

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by the College of Engineering and will follow all policies associated with the College of Engineering.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047 or EECE 5644	Exploring AI Trends and Tools Introduction to Machine Learning and Pattern Recognition	4
PHIL 5110	Responsible AI	4

Experiential Course

Code	Title	Hours
IE 5640	Data Mining for Engineering Applications	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Product Management, Graduate Certificate (Boston)

The Graduate Certificate in Product Management is designed for students with undergraduate degrees in a wide range of fields—including computer science, engineering, economics, business administration, design, and psychology—who want to build the skills necessary for success as product managers. This certificate equips students with the expertise to excel in this dynamic field, whether they are early career professionals, transitioning into product roles, or looking to differentiate themselves in a competitive job market. The program provides a flexible, cost-effective alternative to a full MS program while offering hands-on learning experiences.

Curriculum and Structure

This interdisciplinary certificate offers a structured yet adaptable curriculum that balances foundational knowledge with practical, industry-relevant skills.

The program consists of four courses (12–13 semester hours total):

- Three core courses covering fundamental concepts across key product management functions
- One experiential course (1 credit) providing hands-on learning opportunities tailored to students’ backgrounds and career goals in product management

This certificate allows students to gain real-world experience, develop in-demand skills, and enhance their career opportunities within a streamlined, flexible structure.

Admissions and College Affiliation

Students are admitted to the certificate program through one of the following colleges and follow the academic policies of their home college:

- College of Arts, Media and Design
- College of Engineering
- D’Amore-McKim School of Business
- Office of the Provost and College of Professional Studies¹

This certificate provides a fast, flexible, and practical pathway for students looking to build expertise in product management while benefiting from Northeastern University’s strong academic and professional support network.

¹ Program Structure and Transition

- For the 2025–2026 academic year, the Graduate Certificate in Product Management is being offered as a collaboration between the College of Professional Studies and the Office of the Provost. During this period, students will follow Northeastern's graduate academic calendar and be governed by the academic policies and procedures outlined in the university's *Graduate Catalog*.
- While designated under the Office of the Provost, students will receive full academic and student support services from the College of Professional Studies including academic advising, co-op and career advising, and access to the International Tutoring Center.
- Beginning in the 2026–2027 academic year, the certificate program will transition fully to the College of Professional Studies. At that time, students will be officially designated under CPS in the academic system of record and governed by its academic policies as outlined in the university's *Graduate Catalog*.

Program Requirements
Requirements

Code	Title	Hours
Fundamental Concepts		
ARTG 5600	Experience Design Studio 1: Principles	4
EMGT 6750	Advanced Product Management	3-4

or PDM 6000	Foundations of Product Management	
INNO 6409	Innovation Portfolio Management	4
Experiential Course		
Complete one of the following:		1
ARTG 5540	Design and Product Management	
EMGT 6760	Technical Product Management	
INNO 6411	Product Innovation Management	
PDM 6940	Product Analytics	

Program Credit/GPA Requirement

12 total semester hours required (additional hours may be required based on student choice of course options)

Minimum 3.000 GPA required

College of Arts, Media and Design

Website (<https://camd.northeastern.edu/>)

R. Benjamin Knapp, BS, MS, PhD, Dean

Casper Hartevelde, PhD, Associate Dean for Graduate Programs

Michael Hoppmann, PhD, Associate Dean for Undergraduate Programs

Deirdre Loughridge, PhD, Associate Dean of Faculty Affairs

Thomas Michael, MBA, Associate Dean for Administration and Finance

Andrea Raynor, MFA, Associate Dean for Network, Global Experience, and Partner Programs

Brooke Welles, PhD, Associate Dean of Research

Timothy Blank, MA, Assistant Dean of Student Experience

Katherine Calzada, MEd, Assistant Dean for Faculty Development

Emily Goodman, PhD, Assistant Dean of Creative Technologies

Rachel Moo, MBA, Assistant Dean of Belonging and Engagement

617.373.3682

617.373.5084 (fax)

Graduate Enrollment and Student Services

617.373.5329 or 617.373.2566

gradcamd@northeastern.edu

The College of Arts, Media and Design offers graduate programs that build on existing knowledge and establish innovative areas of inquiry and practice. We work with students to frame, research, and answer transformative questions. Together, we challenge, engage, and shape global cultures and marketplaces.

Our Mission

We create a distinctive experiential education by leveraging emergent practices and scholarship in the arts, media, and design. Our unique combination of disciplines empowers innovative thinking and making. Our students become informed citizens and creative leaders with an entrepreneurial spirit.

Graduate Studies in the College of Arts, Media and Design

Welcome to graduate studies at CAMD. We deliver an outstanding graduate education in traditional areas while exploring new approaches to this generation's transformative questions. Our graduate programs highlight intersectional approaches that bring together human, technological, and data literacies to push the boundaries of our disciplines.

We offer diverse program types to meet individual career and academic goals, including terminal degrees (Doctor of Philosophy, Master of Fine Arts, Master of Architecture); professional degrees (Master of Science, Master of Arts, Master of Design); PlusOne pathways; and Graduate Certificates. Our graduate degree programs are inherently interdisciplinary, led by research faculty across the departments of Art + Design, architecture, journalism, music, and theatre. Coursework incorporates a range of scholarly, applied, and experiential perspectives, complemented by lively community activities including lecture series, exhibitions, symposia, and more.

This is an exciting time to pursue advanced education and scholarship in creative fields. Never have the arts and culture been so clearly essential to our social, economic, and environmental future: From cultural outreach in underserved communities to designing ethical virtual environments for health and security; from green building innovation to cutting-edge journalism; from provocative performances and thought-provoking installations to incisive data visualizations that change how we view the world—our faculty and students are involved in a wealth of academic endeavors, creative enterprises, and professional experience.

Please use these resources to familiarize yourself with the diverse ranges of programs we offer. Don't hesitate to reach out to the graduate program faculty listed in your fields of interest, and be sure to visit CAMD's graduate programs website (<https://camd.northeastern.edu/graduate-students/>) often, where you'll find current news and links.

Academic Policies and Procedures

- General Information (p. 195)
- Grade Appeal Policy (p. 195)
- Graduate Student Classification (p. 196)
- Master's Degree Policies (p. 197)

General Information

Five units in the College of Arts, Media and Design offer programs at the graduate level:

- Architecture (p. 198)
- Art + Design (p. 210)
- Communication Studies (p. 228)
- Journalism (p. 231)
- Interdisciplinary (p. 236)

Grade Appeal Policy

It is the policy of Northeastern University that all students shall be treated fairly in evaluations made of their academic performance, standing, and progress. The university presumes that academic judgments by its faculty are fair, consistent, and objective. Students must understand that the substitution of a different academic judgment for that of the original evaluator is a serious intrusion upon teaching prerogatives. Nonetheless, the university believes it is essential to provide an appeals mechanism to students who believe that they were erroneously, capriciously, or otherwise unfairly treated in an academic or cooperative education determination. This includes claims of misinterpretation or inequitable application of any academic provision of the university's *Graduate Catalog*, *Student Handbook*, or *Faculty Handbook*.

Decisions concerning admission or readmission into a program, including dismissals, and matters related to co-op employment (other than grades received) cannot be appealed beyond the college level. While program dismissals cannot be appealed beyond the college level, underlying academic judgments that led to a dismissal can be appealed.

The steps below are for academic appeals. In the academic appeals procedures described herein, "dean" refers to the dean of the college or a designee. If a student feels that they have been the victim of harassment or of discrimination prohibited by university policy, they should consult with the Office for University Equity and Compliance (<https://ouec.northeastern.edu/>) as soon as they become aware of alleged prohibited harassment or discrimination. A student is not required to wait until a term grade or determination is received before seeking advice or redress. If the OUEC is advised of such alleged prohibited conduct as part of an academic appeal (see below), the appeal shall be pursued and investigated through the OUEC first. In such cases, the student should submit the appeal to the appropriate dean(s) described in Step 2, with a copy also given to the OUEC. Following a resolution of the harassment/discrimination issues, any remaining academic issues will be addressed, at the request of the student, according to the academic appeals procedures.

Before invoking the appeals procedures, students are always encouraged to speak informally to their instructors or graduate program coordinator/director about any determination or grade about which they have questions. If students choose to pursue an appeal, the process is described in the appeals section that follows.

A student may appeal an academic determination by submitting a written statement that details the action or judgment and the basis for the appeal. All parties shall cooperate and act expeditiously in processing the appeal to completion.

All appeals should be initiated and resolved in a timely manner in accordance with the detailed time limits provided in this document.

Though students are always entitled to seek the advice of legal counsel, a student's lawyer cannot be present in the informal or formal academic appeal procedures. A student may consult with the provost or their designee at any point in these procedures for advice or assistance. University officials may take whatever steps they deem reasonably appropriate to achieve resolution of the problem at any stage of these procedures.

It is strongly recommended that international students consult as soon as possible with the Office of Global Services (<https://international.northeastern.edu/ogs/>) to determine the possibility of any repercussion that the timing of an appeal may have on their immigration status.

Scientific or Research Misconduct

Scientific or research misconduct is defined as fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the academic and scientific community for proposing, conducting, or reporting research and does not include honest error or honest differences in interpretation or judgments of data. (Further information can be obtained from the U.S. Office of Research Integrity, Department of Health and Human Services (<https://ori.hhs.gov/>).) Possible incidences of misconduct are to be reported immediately to the provost

or their designee, who will initiate the appropriate procedures. Findings of scientific or research misconduct cannot be appealed through the process below.

Appeal of Final Grades and Outcomes of Other Academic Evaluative Processes

- Step 1: Discuss Concerns with Instructor and/or Graduate Program Coordinator/Director
- Step 2: Prepare an Appeal Statement
- Step 3: Associate Dean of Graduate Programs-Level Resolution
- Step 4: College-Level Appeal
- Step 5: University-Level Appeal

STEP 1: DISCUSS CONCERNS WITH INSTRUCTOR AND/OR GRADUATE PROGRAM COORDINATOR/DIRECTOR

In most cases, students should first discuss their concerns with the faculty member who taught the course to see if it is possible to reach agreement on the issue(s). If the student is not satisfied with the outcome of this discussion, or if the student is not comfortable discussing the issue with the instructor, the student should request a meeting with the appropriate administrator (e.g., program coordinator/director or chair) to further discuss their concerns. If these attempts to informally resolve the issue fail, the student can enter the formal procedure at the college level as follows. Note that this step should occur as soon as possible after the academic determination given the time frame for appeal statement submission described in Step 2.

STEP 2: PREPARE AN APPEAL STATEMENT

A student appeals an academic determination by submitting a written statement (the Statement). The Statement shall include when the problem occurred, who made the disputed determination, the nature of the determination, and what resolution the student is requesting. All relevant supporting materials should be attached to the Statement. The Statement should be submitted no later than 28 calendar days from the day when the academic determination is made available to the student. If the appeal concerns academic probation, a grade, or course evaluation, it is submitted to the associate dean of graduate programs in the college. If, however, the appeal concerns a grade or course evaluation for a course taken in a college other than CAMD, refer to and follow the grade appeal policy for that college (individual college appeal procedures can be viewed within the college's section of this catalog). If a student wishes to dispute a grade in their final term, this must be done within 28 calendar days of degree conferral date.

STEP 3: ASSOCIATE DEAN OF GRADUATE PROGRAMS-LEVEL RESOLUTION

The associate dean of graduate programs shall respond to the student in writing, including specific instructions for the student to seek an informal resolution to the matter, unless such a course of action as outlined by the student in the Statement is demonstrably futile. A copy of this response shall be sent to the graduate program coordinator/director and department chairperson of the appropriate unit. If the student has failed to achieve relief through an informal resolution, the associate dean of graduate programs shall discuss the matter with the department chairperson or equivalent supervisor, who shall attempt to affect an informal resolution. In this case, the student shall also have the right to discuss the matter with the chairperson, or equivalent supervisor, in which department the faculty member involved in the matter serves.

If the appeal involves allegations of prohibited harassment or discrimination, the associate dean of graduate programs shall consult with the OUEC before responding and shall, as part of this response, explain the role that the OUEC will play in Steps 4 and 5 of this procedure.

STEP 4: COLLEGE-LEVEL APPEAL

If the student is not satisfied with the disposition of the matter at Step 3, they may proceed with the appeal through the college's established academic appeals procedure. The dean or the academic standing committee, as applicable, must provide the student and the involved faculty member with a written report of their/its finding(s) and decision.

- This step involves a review by a college academic standing committee making the recommendation to the dean. The student may obtain a copy of the operating rules of the academic standing committee from the dean or their designee.
- In appeals involving allegations of prohibited harassment or discrimination, the dean or academic standing committee shall receive a report of the findings of the investigation of the OUEC. The dean or committee shall be without authority to reverse or modify the OUEC finding(s) or resolution and, instead, shall work to resolve the remaining academic appeal issue(s).

STEP 5: UNIVERSITY-LEVEL APPEAL

If the student is not satisfied with the college's disposition of the matter, or if the appeal is not resolved within 35 calendar days after having been submitted to the associate dean of graduate programs pursuant to Step 2, they may appeal the matter to the university level. The student shall submit a request in writing, within 10 calendar days of the finding of the college in Step 4, that the university convene the Academic Appeals Resolution Committee to review the issue. This committee has been designated as the final authority on these matters. Please refer to Academic Appeals Policies and Procedures (p. 133) in the graduate section of this catalog for information about this process.

Graduate Student Classification

Regular Student

Those students who are admitted to a degree program.

Conditional Student

Students whose admissions files are missing documentation. A student who has not provided required documentation for admission by the due date for final grades for the student's first academic term will not be permitted to register for a future term.

Special Student

Special students are enrolled on a part-time basis (no more than 6 semester hours per semester). Credit can be earned for a maximum of 12 semester hours over time. Students interested in taking more than 12 semester hours must make a formal application to the degree program through Northeastern University's online application portal (<https://camd.northeastern.edu/apply/>). Special students who do not register for four consecutive semesters (excluding summer semester) will be subject to review and possible withdrawal by CAMD graduate studies.

Student Status

For academic purposes, a graduate student is considered a full-time student if enrolled in a minimum of 8 semester hours of credit for the semester, with the following exceptions:

- A student is considered full time if enrolled in a full-time co-op (p. 137).
- Students enrolled in PhD program Dissertation or PhD program Dissertation Continuation are considered full time.

Note: Full-time status may be defined differently for federal loan purposes. For information, contact Student Financial Services (<https://studentfinance.northeastern.edu/>), 617.373.5899.

Master's Degree Policies

The College of Arts, Media and Design graduate studies sets minimum standards for all students to fulfill. In addition, departments and programs may have requirements that exceed the standards outlined below.

A candidate for the master's degree must complete a minimum of 30 semester hours of graduate-level coursework and such other study as may be required by the department in which the student is registered. To qualify for the degree, a minimum cumulative grade-point average of 3.000, equivalent to a grade of B, must be obtained. This average will be calculated each semester. A student who does not make satisfactory progress toward degree requirements, as specified by the individual department, may be terminated from the program.

To maintain current student status within CAMD, graduate students must make satisfactory progress in their degree, including working toward the graduation requirement of a GPA of 3.000 and the timely completion of coursework. See the university policy Minimum Cumulative GPA (p. 141).

All students must be registered in the last semester of their program. Any student who does not attend Northeastern University for a period of one year will be required to apply for readmission.

Electives

No more than 8 semester hours of electives may be taken outside of CAMD. Any additional non-CAMD elective hours will not count toward the degree.

Graduate Student Scholarship

Students who are registered in degree programs are eligible for a CAMD Graduate Student Scholarship. Award recipients will receive an official award letter from CAMD graduate studies. Pay attention to this letter as it is an official contract that should be read carefully. The GSS is contingent on satisfactory academic progress toward the degree and meeting department-specific guidelines. Recipients must be in full-time status and be registered for a minimum of 8 semester hours. Note, however, that recipients remain eligible for the GSS in their final semester even if they are enrolled in less than 8 semester hours. Receipt of financial support administered by CAMD graduate studies requires that all students receiving awards must maintain a 3.000 cumulative GPA. Students whose cumulative GPA is below 3.000 will be placed on academic probationary status and are not eligible to receive the award while on probation. The GSS can be reactivated by raising the cumulative GPA to 3.000 in the subsequent semester; students who do not meet the minimum GPA requirement at the end of the next semester cannot receive additional probationary periods.

Leave of Absence

Full-time students who are not involved in any academic endeavor for a period of time are required to petition the manager of student services, through their department, for a leave of absence (p. 120) by completing the leave of absence petition through the Student Hub (<https://me.northeastern.edu/>). CAMD graduate studies will not accept retroactive leave requests. Note that if a student is requesting a leave for medical reasons, students should contact University Health and Counseling Services (<https://uhcs.northeastern.edu/>). Leaves of absence generally are not approved for more than one calendar year at a time. International students must consult with an advisor at the Office of Global Services (<https://international.northeastern.edu/ogs/>) for proper guidance. Leaves of absence are not appropriate for master's degree students who are working on a thesis but are away from the Northeastern campus. Except in the case of medical leaves, being on an approved leave of absence does not extend the amount of time allowed for degree completion or the makeup of incomplete grades.

Time Limitation

For the master's degree, course credits earned in the program of graduate study are valid for a maximum of seven years.

If a student wishes to apply for an extension of the time limit, they must submit a petition to their department of study. The petition must include a detailed plan for completion of all remaining degree requirements. In the case of time-limit extension requests for master's degree coursework, the department must certify that the content of each of the courses has not changed since the time the student completed the course. If deemed appropriate, the department will recommend approval of the extension to CAMD graduate studies.

Changes in Requirements

The continuing development of CAMD graduate studies forces regular revision of curricula. When no hardship is imposed on the student because of changes and the facilities (e.g., equipment, technology, studios, etc.) of the college permits, the student is encouraged to meet the more recent program requirements. This requires application to change the catalog term of the student's program of study. To accomplish this, the student's advisor can assist the student with the process of applying to change catalog term. However, if it can be demonstrated that doing so imposes a substantial hardship, the requirements of the year in which the student matriculated will be applicable.

Thesis

Theses are required in some programs and should demonstrate the individual's capacity to execute independent work based on original material. Registration for the thesis course is required. Theses must be approved by the departmental graduate committee and must receive a grade of B (3.000) or better to be accepted. Students who have not completed their thesis after having registered for the specified number of thesis credits must register and pay for Thesis Continuation.

School of Architecture

Website (<https://camd.northeastern.edu/architecture/>)

Daniel Adams, MArch

Associate Professor and Director of the School of Architecture
617.373.4637
da.adams@northeastern.edu

Master of Architecture

Northeastern University offers a Master of Architecture degree accredited by the National Architectural Accrediting Board (<http://www.naab.org>).

The program leverages the school's outstanding faculty and pragmatically grounded curriculum. The physical and cultural context of Boston serves as a laboratory for the program's design studios and is design focused but with a different approach than many schools. We find opportunities for innovation within the real estate and construction industries and current policy debates—rather than outside them. This is how we intend to move architects to the center of the discussion about the future of our cities.

Students take courses in urban housing, practice-integrated design, and do original research on market-driven building types. The final degree project in the design studio offers an opportunity to leverage this research with real innovations in hybrid types, strategic alterations to existing ones, and to take on the challenge of finding prototypical solutions for systemic problems.

In addition to studio courses, graduate students take seminars in architectural theory and design strategy; and electives are available in real estate development, sustainable building techniques, urban landscape, and other topics. There is also a unique course that looks at case studies of architecture firms in practice, problem solving, and innovation. We seek to have students leave our program with a unique balance of technical, theoretical, and strategic tools to make a real difference in the profession.

Programs

Master of Architecture (MArch)

- One-Year Program (p. 198) (Boston)
- Two-Year Program (p. 199) (Boston)
- Three-Year Program (p. 202) (Boston)
- Three-Year Program—Advanced Degree Entrance (p. 205) (Boston)

Master of Design for Sustainable Urban Environments (MDes-SUEN)

Admissions to these programs have been suspended.

- One-Year Program (p. 209) (Boston)
- Two-Year Program (p. 209) (Boston)

Master of Architecture—One-Year Program (Boston)

This program gives eligible candidates the opportunity to get a NAAB-accredited (<http://www.naab.org>) Master of Architecture degree in one year.

Open to candidates with either a Bachelor of Science in Architecture from Northeastern University or a professional Bachelor of Architecture degree from an accredited North American program with at least one year of IDP-approved professional experience.

Students engage in a two-semester research and design project based on pertinent contemporary topics chosen by the graduate faculty, or students may propose an independent research and design project. Team research is conducted and compiled into online and physical research books. This body of compiled research then becomes the basis of the intellectual framework for the individual students' design projects. This final degree project

parallels an in-depth two-semester professional practice sequence that analyzes all of the contingencies of successful architectural projects, including architectural offices and their project management strategies, real estate development criteria, and associated project finance.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Professional Practice		
ARCH 6430	Case Studies 1	4
ARCH 6440	Case Studies 2	4
Topics and Seminars		
ARCH 6330	Seminar in Modern Architecture	4
ARCH 6340	Graduate Topics in Architecture	4
Research and Project		
ARCH 7130	Master's Research Studio	6
ARCH 7140	Master's Degree Project	6

Elective

Code	Title	Hours
Students must complete a 4-semester-hour graduate elective.		4

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARCH 6330	4	ARCH 6340	4	Vacation	0	Vacation	0
ARCH 6430	4	ARCH 6440	4				
ARCH 7130	6	ARCH 7140	6				
Elective (Required)	4						
	18		14		0		0

Total Hours: 32

Master of Architecture—Two-Year Program (Boston)

This program offers students who have earned a Bachelor of Science in Architecture from an institution other than Northeastern University to engage in the urban-focused curriculum that is offered at the School of Architecture. Students are awarded a MArch degree, which is NAAB-accredited (<http://www.naab.org>).

Year One

Urban Architecture Studio (ARCH 6115) engages students with a series of design interventions to improve our public realm. Students have the opportunity to learn about timely issues, including decarbonization and adaptive reuse, at the scale of the human, material, building, and urban networks.

Option Studio (ARCH 5115) offers topical content that best aligns with the research and practice expertise of the faculty, which provides students with the latest concepts in architectural design, theory, and research on a consistently updated and rotating basis. Students select their top choices of studio topics and instructors, giving them more flexibility in the areas for which they would like to focus their education. Additionally, students take classes in technology as well as architecture seminars and electives.

Year Two

Integration Studio (ARCH 7120) and Integrated Building Systems (ARCH 7220) encourage students to explore the theories and practices of integrating building systems, their detailing and assembly, to create high-performing, long-lasting, and humane architecture. These courses offer students an opportunity to draw on the full range of their prior architectural education to produce a design that synthesizes specific criteria to build sustainable and culturally valuable environments for generations of human use.

In the final year, students also engage in a two-semester research and design project based on pertinent contemporary topics chosen by the graduate faculty. In the fall semester, students study contemporary research strategies and ethics in architecture, landscape, and urbanism, giving them the opportunity to formulate original approaches to design thinking and research. This research will serve as the basis of the intellectual framework for the individual students' design projects in the spring semester. This final degree project parallels an in-depth professional practice course that analyzes all of the contingencies of successful architectural projects, including architectural offices and their project management strategies, real estate development criteria, and associated project finance.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Building and Environment		
ARCH 5210	Environmental Systems	4
ARCH 7220	Integrated Building Systems	4
Studio		
ARCH 5115	Option Studio	6
ARCH 6115	Urban Architecture Studio	6
ARCH 7120	Integration Studio	6
Professional Practice		
ARCH 5430	Introduction to Professional Practice in Architecture	4
ARCH 6440	Case Studies 2	4
Topics and Seminars		
Complete two of the following:		8
ARCH 5310	Design Tactics and Operations	4
ARCH 5330	Theories of Architecture and Urbanism	4
ARCH 6340	Graduate Topics in Architecture	4
Research and Thesis Project		
ARCH 7140	Master's Degree Project	6
ARCH 7430	Topics In Research Methods in Architectural Design	4

Concentrations or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Data Visualization (p. 200)
- Experience Design (p. 201)
- Extended Realities (p. 201)
- Sustainable Building Systems (p. 201)
- Sustainable Urban Environments (p. 201)
- Urban Analytics (p. 201)
- Urban Studies (p. 201)
- Electives Option (p. 202)

Program Credit/GPA Requirements

60 total semester hours required (64 if a concentration is declared)

Minimum 3.000 GPA required

CONCENTRATION IN DATA VISUALIZATION

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
Complete one of the following:		4
ARTG 5310	Visual Cognition	

ARTG 6110	Information Design Theory and Critical Thinking
ARTG 6330	Information Design Mapping Strategies

CONCENTRATION IN EXPERIENCE DESIGN

Code	Title	Hours
Required Courses		
ARTG 5610	Design Systems	4
ARTG 6310	Design for Behavior and Experience	4
Complete one of the following:		4
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	

CONCENTRATION IN EXTENDED REALITIES

Code	Title	Hours
Required Course		
EXRE 5010	Immersive Media: Extended Realities (XR) History, Theory, and Impact	4
Complete two of the following:		8
EXRE 5020	Developing Extended Realities (XR)	
EXRE 5030	Designing Extended Realities (XR)	
GSND 6520	3D Modeling and Asset Creation Principles	

CONCENTRATION IN SUSTAINABLE BUILDING SYSTEMS

Code	Title	Hours
Required Courses		
SBSY 5100	Sustainable Design and Technologies in Construction	4
SBSY 5200	Sustainable Engineering Systems for Buildings	4
Complete one of the following:		4
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
SBSY 5250	Building Performance Simulation	
SBSY 5300	Information Systems for Integrated Project Delivery	

CONCENTRATION IN SUSTAINABLE URBAN ENVIRONMENTS

Code	Title	Hours
Required Course		
SUEN 6340	Topics in Urban Environmental Design	4
Complete two of the following:		8
LPSC 7312	Cities, Sustainability, and Climate Change	
SUEN 6210	Implementation and Visualization for Urban Environments 1	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	

CONCENTRATION IN URBAN ANALYTICS

Code	Title	Hours
Required Courses		
ARTG 5320	Statistics for Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6330	Information Design Mapping Strategies	4

CONCENTRATION IN URBAN STUDIES

Code	Title	Hours
Required Course		
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
LPSC 7312	Cities, Sustainability, and Climate Change	4

SUEN 6340	Topics in Urban Environmental Design	4
Any 5000-level or higher PPUA course		

ELECTIVES OPTION

Code	Title	Hours
Required Electives		
Complete 8 semester hours of non-ARCH courses.		8

Plan of Study**Sample Plan of Study****ELECTIVES OPTION**

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARCH 6115		6 ARCH 5115		6 Vacation		Vacation	
ARCH 5210 and ARCH 5211		4 ARCH 5340		4			
ARCH 5330 or 5310		4 Elective 2		4			
Elective 1		4					
	18		14		0		0
Year 2							
Fall	Hours	Spring	Hours				
ARCH 7120		6 ARCH 6440		4			
ARCH 7220		4 ARCH 7140		6			
ARCH 7430		4 ARCH 5330 or 6340		4			
Optional concentration course							
	14		14				
Total Hours: 60							

Master of Architecture—Three-Year Program (Boston)

Open to candidates who do not have a Bachelor of Science in Architecture or equivalent.

Applicants from all disciplines are welcome. Those who have some architecture coursework may be eligible for advanced placement.

The program requires three years of study. Students have the option to pursue a summer co-op opportunity managed by Northeastern University's co-op program.

After completing a first-year introductory curriculum, students in the three-year program merge into the two-year MArch curriculum. This is a NAAB-accredited (<http://www.naab.org>) degree program.

Year One

In the first year, students take intensive studios, technology classes, and architectural history classes to immerse them in the studio culture of the school and to give them a strong foundation to begin the upper-level studios. The introductory graduate skills and design studios are specifically designed for the students in this program who do not have experience doing architectural drawing and designing. Students complete a series of projects that will give them an opportunity to develop the skills and the critical thinking needed in the graduate curriculum.

Year Two

Students continue to develop their core skills in the Urban Architecture Studio. In the spring semester, the Option Studio offers topical content that best aligns with the research and practice expertise of the faculty, which provides students with the latest concepts in architectural design, theory, and research on a consistently updated and rotating basis. Students select their top choices of studio topics and instructors, giving them more flexibility in the areas for which they would like to focus their education.

Year Three

In the final year, the Integration Studio in the fall semester challenges students to consider architectural connections at all scales, from architectural detail, to architectural systems, to the whole building and its urban context. Students also engage in a two-semester research and design project based on pertinent contemporary topics chosen by the graduate faculty, or students may propose an independent research and design project. Team research is conducted and compiled into online and physical research books. This body of compiled research then becomes the basis of the intellectual framework for the individual students' design projects. This final degree project parallels an in-depth professional practice course that

analyzes all of the contingencies of successful architectural projects, including architectural offices and their project management strategies, real estate development criteria, and associated project finance.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
History		
ARCH 2340	Modern Architecture	4
ARCH 5340	Architectural and Urban Histories	4
Building, Design, and Environment		
ARCH 2240	Architectonic Systems	4
ARCH 3450	Advanced Architectural Communication	4
ARCH 5210 and ARCH 5211	Environmental Systems and Recitation for ARCH 5210	4
ARCH 5230 and ARCH 5231	Structural Systems and Recitation for ARCH 5230	4
ARCH 7220	Integrated Building Systems	4
Studio		
ARCH 5115	Option Studio	6
ARCH 6100	Graduate Skills Studio	6
ARCH 6115	Urban Architecture Studio	6
ARCH 6200	Graduate Studio 1: Architectural Design	6
ARCH 7120	Integration Studio	6
Professional Practice		
ARCH 5430	Introduction to Professional Practice in Architecture	4
ARCH 6440	Case Studies 2	4
Topics and Seminars		
ARCH 5310	Design Tactics and Operations	4
ARCH 5330	Theories of Architecture and Urbanism	4
ARCH 6340	Graduate Topics in Architecture	4
Research and Project		
ARCH 7140	Master's Degree Project	6
ARCH 7430	Topics In Research Methods in Architectural Design	4

Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Data Visualization (p. 204)
- Experience Design (p. 204)
- Extended Realities (p. 204)
- Sustainable Building Systems (p. 204)
- Sustainable Urban Environments (p. 204)
- Urban Analytics (p. 204)
- Urban Studies (p. 205)
- Electives (p. 205)

Program Credit/GPA Requirements

100 total semester hours required (108 with optional electives)

Minimum 3.000 GPA required

CONCENTRATION IN DATA VISUALIZATION

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
Complete one of the following:		4
ARTG 5130	Visual Communication for Information Design	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN EXPERIENCE DESIGN

Code	Title	Hours
Required Courses		
ARTG 5610	Design Systems	4
ARTG 6310	Design for Behavior and Experience	4
Complete one of the following:		4
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	

CONCENTRATION IN EXTENDED REALITIES

Code	Title	Hours
Required Course		
EXRE 5010	Immersive Media: Extended Realities (XR) History, Theory, and Impact	4
Complete two of the following:		8
EXRE 5020	Developing Extended Realities (XR)	
EXRE 5030	Designing Extended Realities (XR)	
GSND 6520	3D Modeling and Asset Creation Principles	

CONCENTRATION IN SUSTAINABLE BUILDING SYSTEMS

Code	Title	Hours
Required Courses		
SBSY 5100	Sustainable Design and Technologies in Construction	4
SBSY 5200	Sustainable Engineering Systems for Buildings	4
Complete one of the following:		4
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
SBSY 5250	Building Performance Simulation	
SBSY 5300	Information Systems for Integrated Project Delivery	

CONCENTRATION IN SUSTAINABLE URBAN ENVIRONMENTS

Code	Title	Hours
Required Course		
SUEN 6340	Topics in Urban Environmental Design	4
Complete two of the following:		8
LPSC 7312	Cities, Sustainability, and Climate Change	
SUEN 6210	Implementation and Visualization for Urban Environments 1	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	

CONCENTRATION IN URBAN ANALYTICS

Code	Title	Hours
Required Courses		
ARTG 5320	Statistics for Design	4

ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6330	Information Design Mapping Strategies	4

CONCENTRATION IN URBAN STUDIES

Code	Title	Hours
Required Course		
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
Complete two of the following:		8
LPSC 7312	Cities, Sustainability, and Climate Change	
SUEN 6340	Topics in Urban Environmental Design	
Any 5000-level or above PPUA course		

ELECTIVES OPTION

Code	Title	Hours
Required Electives		
Complete 12 semester hours of non-ARCH courses.		12
Optional Electives		
Complete 8 semester hours of ARCH courses (optional). Electives outside architecture may be taken in consultation with your faculty advisor.		8

Plan of Study**Sample Plan of Study—Electives Option**

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARCH 6100		6 ARCH 6200		6 Vacation		Vacation	
ARCH 2240		4 ARCH 2340 and ARCH 2341		4			
ARCH 5340		4 ARCH 3450 (or required elective)		4			
Elective (1/3)		4 Elective (2/3)		4			
		18	18		0		0
Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARCH 6115		6 ARCH 5115		6 Vacation		Vacation	
ARCH 5310		4 ARCH 5430		4			
ARCH 5210 and ARCH 5211		4 ARCH 5330		4			
Elective (3/3)		4 ARCH 5230 and ARCH 5231		4			
		18	18		0		0
Year 3							
Fall	Hours	Spring	Hours				
ARCH 7120		6 ARCH 7140		6			
ARCH 7220		4 ARCH 6440		4			
ARCH 7430		4 ARCH 6340		4			
Elective (optional)		Elective (optional)					
		14	14				

Total Hours: 100**Master of Architecture—Three-Year Program—Advanced Degree Entrance (Boston)**

The Master of Architecture, Three-Year Program with Advanced Entry is open to applicants who have not earned a Bachelor of Science in Architecture or an equivalent degree but have some background in architectural studies or engineering. The program carries the same requirements as the Master of Architecture, Three-Year Program except that 4–20 semester hours of first-year coursework will be waived at the discretion of the program director, in consultation with program faculty members, based on the applicant's prior coursework, academic transcript, and portfolio or work samples.

This is an NAAB-accredited (<http://www.naab.org/>) degree program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundation Courses

Students may be required to complete up to 16 semester hours of foundation coursework as determined by the program advisor, based on the applicant's prior coursework, academic transcript, and portfolio or work samples. Waivers are determined by the faculty; students should consult with their advisors.

Code	Title	Hours
History		
ARCH 2340	Modern Architecture	4
ARCH 5340	Architectural and Urban Histories	4
Building, Design, and Environment		
ARCH 2240	Architectonic Systems	4
ARCH 5210	Environmental Systems	4
ARCH 5230	Structural Systems	4

Core Requirements

Code	Title	Hours
Building, Design, and Environment		
ARCH 3450	Advanced Architectural Communication	4
ARCH 7220	Integrated Building Systems	4
Studio		
ARCH 5115	Option Studio	6
ARCH 6100	Graduate Skills Studio	6
ARCH 6115	Urban Architecture Studio	6
ARCH 6200	Graduate Studio 1: Architectural Design	6
ARCH 7120	Integration Studio	6
Professional Practice		
ARCH 5430	Introduction to Professional Practice in Architecture	4
ARCH 6440	Case Studies 2	4
Topics and Seminars		
ARCH 5310	Design Tactics and Operations	4
ARCH 5330	Theories of Architecture and Urbanism	4
ARCH 6340	Graduate Topics in Architecture	4
Research and Project		
ARCH 7140	Master's Degree Project	6
ARCH 7430	Topics In Research Methods in Architectural Design	4

Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Data Visualization (p. 207)
- Experience Design (p. 207)
- Extended Realities (p. 207)
- Sustainable Building Systems (p. 207)
- Sustainable Urban Environments (p. 207)
- Urban Analytics (p. 207)
- Urban Studies (p. 208)
- Electives Option (p. 208)

Program Credit/GPA Requirements

80–96 total semester hours required

Minimum 3.000 GPA required

CONCENTRATION IN DATA VISUALIZATION

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
Complete one of the following		4
ARTG 5310	Visual Cognition	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN EXPERIENCE DESIGN

Code	Title	Hours
Required Courses		
ARTG 5610	Design Systems	4
ARTG 6310	Design for Behavior and Experience	4
Complete one of the following:		4
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	

CONCENTRATION IN EXTENDED REALITIES

Code	Title	Hours
Required Course		
EXRE 5010	Immersive Media: Extended Realities (XR) History, Theory, and Impact	4
Complete two of the following:		8
EXRE 5020	Developing Extended Realities (XR)	
EXRE 5030	Designing Extended Realities (XR)	
GSND 6520	3D Modeling and Asset Creation Principles	

CONCENTRATION IN SUSTAINABLE BUILDING SYSTEMS

Code	Title	Hours
Required Courses		
SBSY 5100	Sustainable Design and Technologies in Construction	4
SBSY 5200	Sustainable Engineering Systems for Buildings	4
Complete one of the following:		4
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
SBSY 5250	Building Performance Simulation	
SBSY 5300	Information Systems for Integrated Project Delivery	

CONCENTRATION IN SUSTAINABLE URBAN ENVIRONMENTS

Code	Title	Hours
Required Course		
SUEN 6340	Topics in Urban Environmental Design	4
Complete two of the following:		8
SUEN 6210	Implementation and Visualization for Urban Environments 1	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	

CONCENTRATION IN URBAN ANALYTICS

Code	Title	Hours
Required Courses		
ARTG 5320	Statistics for Design	4

ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6330	Information Design Mapping Strategies	4

CONCENTRATION IN URBAN STUDIES

Code	Title	Hours
Required Course		
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
Complete two of the following:		8
LPSC 7312	Cities, Sustainability, and Climate Change	
SUEN 6340	Topics in Urban Environmental Design	
Any 5000-level or above PPUA course		

ELECTIVES OPTION

Code	Title	Hours
Required Electives		
Complete 12 semester hours of non-ARCH courses (required).		12
Optional Electives		
Complete up to 8 additional semester hours.		8

Plan of Study**Sample Plan of Study**

All students in this program must complete a minimum of 8 semester hours per semester in the first year.

Note: This sample plan of study presumes that the Modern Architecture (ARCH 2340) and Recitation for ARCH 2340 (ARCH 2341) requirements of the Master of Architecture, Three-Year Program have been waived based on the applicant's prior coursework and portfolio or work samples. These two courses would otherwise be completed in Year 1 spring in the standard Master of Architecture, Three-Year program. Given the waiver of those requirements, the student will complete the Master of Architecture, Three-Year Program with Advanced Entry at 96 semester hours of study, in comparison to the 100 semester hours of study required for the Master of Architecture, Three-Year Program.

Year 1			
Fall	Hours	Spring	Hours
ARCH 2240		4 ARCH 3450	4
ARCH 5340		4 ARCH 6200	6
ARCH 6100		6 Elective (2/3)	4
Elective (1/3)		4	
		18	14
Year 2			
Fall	Hours	Spring	Hours
ARCH 5210 and ARCH 5211		4 ARCH 5115	6
ARCH 5310		4 ARCH 5330	4
ARCH 6115		6 ARCH 5430	4
Elective (3/3)		4 ARCH 5230 and ARCH 5231	4
		18	18
Year 3			
Fall	Hours	Spring	Hours
ARCH 7120		6 ARCH 6340	4
ARCH 7220		4 ARCH 6440	4
ARCH 7430		4 ARCH 7140	6
Elective (optional)		Elective (optional)	
		14	14
Total Hours: 96			

Sustainable Urban Environments, MDes—One-Year Program (Boston)

Admissions to this program have been suspended.

The one-year Master of Design for Sustainable Urban Environments (MDes-SUEN) is open to students holding an accredited, first-professional degree in landscape architecture, architecture, planning, or urban design. The 36-credit program offers a core sequence of advanced design research studios, proseminars, and urban ecology and technology workshops complemented by interdisciplinary electives.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code Studio	Title	Hours
SUEN 7130	Master's Research Studio: Design and the Resilient City	6
SUEN 7140	Master's Research Studio: Master's Project	6
Proseminar		
Complete 8 semester hours from the following (repeatable) courses:		8
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	
SUEN 6340	Topics in Urban Environmental Design	
Technology		
SUEN 7230	Urban Ecologies and Technologies 1	4
SUEN 7240	Urban Ecologies and Technologies 2	4

Electives

Electives in other disciplines may be taken in consultation with your faculty adviser.

Code	Title	Hours
Complete 8 semester hours from the following subject areas:		8
SUEN, ARCH, LARC, PPUA, LPSC, and SBSY		

Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Year 1			
Fall	Hours	Spring	Hours
SUEN 7130		6 SUEN 7140 (or co-op*)	6
SUEN 7230		4 SUEN 7240	4
SUEN 7320 or 6340		4 SUEN 7320	4
Elective (required)		4 Elective (required)	4
		18	18

Total Hours: 36

*Students may opt to do a graduate co-op. Co-op does not count toward degree credits.

Sustainable Urban Environments, MDes—Two-Year Program (Boston)

Admissions to this program have been suspended.

The two-year Master of Design for Sustainable Urban Environments (MDes-SUEN) is open to students entering with a bachelor's degree in any field. The 64-credit program provides a full year of core skill sets including design; site analysis, implementation, and visualization; history/theory; and policy. This includes introduction to basic earthworks, water, and plants systems as well as the principles of landscape and urban ecology.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Studio		
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	6
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	6
SUEN 7130	Master's Research Studio: Design and the Resilient City	6
SUEN 7140	Master's Research Studio: Master's Project	6
Cities: Design and Planning		
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	4
LPSC 7312	Cities, Sustainability, and Climate Change	4
Proseminar		
Complete 8 semester hours from the following (repeatable) courses:		8
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	
SUEN 6340	Topics in Urban Environmental Design	
Technology		
SUEN 6210	Implementation and Visualization for Urban Environments 1	4
SUEN 6220	Implementation and Visualization for Urban Environments 2	4
SUEN 7230	Urban Ecologies and Technologies 1	4
SUEN 7240	Urban Ecologies and Technologies 2	4

Electives

Electives in other disciplines may be taken in consultation with your faculty adviser.

Code	Title	Hours
Complete 8 semester hours from the following subject areas:		8
SUEN, ARCH, LARC, PPUA, LPSC, SBSY		

Program Credit/GPA Requirements

64 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
SUEN 6110		6 SUEN 6120		6 Vacation		0 Vacation	0
SUEN 6210	4	SUEN 6220	4				
SUEN 6310	4	LPSC 7312	4				
Elective (Required)	4	Elective (Required)	4				
	18		18		0		0
Year 2							
Fall	Hours	Spring	Hours				
SUEN 7130		6 SUEN 7140 (or co-op)*	6				
SUEN 7320 (or)	4	SUEN 7320	4				
SUEN 6340		SUEN 7240	4				
SUEN 7230	4	Elective (Optional)	4				
Elective (Optional)	4						
	18		18				

Total Hours: 72

*Note: Students may opt to do a graduate co-op. Co-op does not count toward degree credits.

Total credits required are 64 (with two optional electives, 72).

Dietmar Offenhuber, PhD
Chair

Julia Hechtman, MFA
Associate Chair

617.373.4340

The graduate programs in the Department of Art + Design are designed to cultivate capacity and fluency in a range of disciplines and practices to create and deliver value and benefit for an increasingly connected and diverse world. Spanning many subjects, interests, and intentions across disparate fields and manifold practices of art, media, and design, our master's and certificate programs will challenge and inspire you to push the boundaries of cultural production and stewardship and social and civic impact. We strive to empower you to bring your ideas to life through design conversations, media making, and artistic expression and enjoy richly rewarding careers and lives.

Programs

Master of Fine Arts (MFA)

- Experience Design (p. 211) (Boston)
- Information Design and Data Visualization (p. 213) (Boston)

Master of Science (MS)

- Experience Design (p. 215) (Boston)
- Game Science and Design (p. 217) (Boston)
- Game Science and Design (p. 219) (Oakland)
- Information Design and Data Visualization (p. 221) (Boston)
- Information Design and Data Visualization (p. 222) (Vancouver)
- Media Innovation and Data Communication (p. 223) (Boston)

Graduate Certificate

- Experience Design (p. 225) (Boston)
- Game Experience Design (p. 225) (Boston)
- Game Science (p. 226) (Boston)
- Information Design and Visualization (p. 227) (Boston)
- Product Management (p. 192) (Boston)

Experience Design, MFA (Boston)

The Master of Fine Arts in Experience Design embraces research-driven design thinking for entrepreneurship, innovation, and other areas, preparing students to be vital contributors and leaders at the intersection of innovation and design.

Experience design is a holistic and integrative approach to design that utilizes investigation into the human experience in specific situations to improve its quality, given an understanding of human goals, needs, and desires. For example, in the context of healthcare, an experience designer does not focus on the design of any one technology product, information system, or physical space. Instead, the designer is charged with understanding and improving the overall sequence of events that impact the patient before and during a hospital stay as well as through follow-up care.

The experience design program moves beyond design thinking to produce outcomes that demonstrate the value of human-centered research and design methods. It draws on findings from a range of professional and scholarly disciplines (including business, psychology, human-computer interaction, engineering, cybernetics) to understand and shape specific situations. It extends across many industries and aspects of life: healthcare, technology, services, travel, education, entertainment, shopping, dining, and the nature of work itself.

Through examining how people behave in a real context in relation to emerging technologies, the Master of Fine Arts in Experience Design allows graduates from design and related disciplines (such as communications, computer science, business, architecture, art, journalism, humanities, and the social sciences) to gain knowledge and experience in the design competencies. To accomplish these goals, students study how to invoke cooperation, collaboration, and integration across disciplines and practices.

The Master of Fine Arts in Experience Design seeks to prepare students to be vital contributors and leaders of professional experience design teams where technological innovation intersects with design. Successful graduates should be able to analyze how people undergo real-world situations, enabling them to enrich experience by orchestrating new design-driven relationships. They will be equipped with the skills to identify shortcomings as well as opportunities for improved engagement between systems and elements—virtual or physical—with the humans who encounter them.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
ARTG 5120	Research Methods for Design	4
ARTG 5600	Experience Design Studio 1: Principles	4
ARTG 5610	Design Systems	4
ARTG 5620	Notational Systems for Experience	4
ARTG 5640	Prototyping for Experience Design	4
ARTG 6310	Design for Behavior and Experience	4
ARTG 6600	Experience Design Studio 2: Group and Interpersonal	4
ARTG 6700	Design Studio 3: Synthesis	4
Thesis		
ARTG 7100	Critical Design and Research Seminar	4
ARTG 7910	Design Project and Exhibition	4
ARTG 7990	Thesis	4

Electives

Code	Title	Hours
Complete 16 semester hours of elective courses, such as these, in consultation with your advisor (multiple completions of ARTG 5000 may apply toward the elective requirement):		16
ARTG 5000	Topics in Design	
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics for Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5710	Design for Dignity	
ARTG 6110	Information Design Theory and Critical Thinking	
GSND 6320	Psychology of Play	
ARTG 6330	Information Design Mapping Strategies	
GSND 6340	Biometrics of Design	

Program Credit/GPA Requirements

60 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Sample Plan of Study: Two Years, One (Optional) Co-op

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
ARTG 5600		4 ARTG 5610		4 Co-op or vacation	
ARTG 5120		4 ARTG 6310		4	
ARTG 5620		4 ARTG 6600		4	
ARTG 5640		4 Elective		4	
		16		16	0
Year 2					
Fall	Hours	Spring	Hours		
ARTG 6700		4 ARTG 7910		4	
ARTG 7100		4 ARTG 7990		4	
Elective		4 Elective		4	
Elective		4			
		16		12	
Total Hours: 60					

Information Design and Data Visualization, MFA (Boston)

The Master of Fine Arts in Information Design and Data Visualization program uniquely combines design training and analytical methods with distinctive approaches to theoretical, visual, and technical aspects of visual communication. Successful graduates gain expertise in the visual and technological languages of data, applying modes of visual cognition, and using analytics tools to create interactive, data-driven communication and installations.

This design-centric program seeks to prepare graduates to collaborate across a variety of fields and settings, crossing the bridge between technology, public communication, and systems design. Successful graduates are prepared to be professional information designers and data visualization experts in design agencies, research institutions, industry, and public institutions, able to lead and collaborate in this dynamic and burgeoning interdisciplinary field of practice and research. Students also are well positioned to pursue PhDs and academic careers. Students have the unique advantage of studying at a major research university known for interdisciplinary collaboration located in Boston—a global center for technology, science, education, and culture—offering diverse opportunities for practice and research in information design and data visualization.

The MFA-IDDV curriculum includes studio courses and seminars in graphic, information, and interaction design; creative inquiry; research methodologies; data literacies; and visualization technologies. It integrates faculty instruction with visiting artists and researchers. The degree requires 60 credit hours over two academic years, with an option to engage in Northeastern's renowned co-op program. A thesis project, a written thesis, and an accompanying work exhibition in the thesis show are required.

Learn more about IDDV projects, students, and faculty at Information Design and Data Visualization (<http://northeastern.edu/visualization/>).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Studio		
ARTG 5100	Information Design Studio 1: Principles	4
ARTG 6100	Information Design Studio 2: Dynamic Mapping and Models	4
ARTG 6700	Design Studio 3: Synthesis	4
Theory and Research Methods		
ARTG 5310	Visual Cognition	4
ARTG 5320	Statistics for Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6110	Information Design Theory and Critical Thinking	4
Design and History		
ARTG 5110	Information Design History	4
ARTG 5120	Research Methods for Design	4
ARTG 5710	Design for Dignity	4
Thesis		
ARTG 7100	Critical Design and Research Seminar	4
ARTG 7910	Design Project and Exhibition	4
ARTG 7990	Thesis	4

Electives

Code	Title	Hours
In consultation with faculty advisor, complete two courses from the following (one of the electives can be chosen from any Northeastern graduate courses; multiple completions of ARTG 5000 may apply toward the elective requirement):		8
ARTG 5000	Topics in Design	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
ARTG 5130	Visual Communication for Information Design	
ARTG 5150	Information Visualization Principles and Practices	
ARTG 5151	Information Design Critique Seminar	
ARTG 5430	Visualization Technologies 2: Advanced Practices	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	
ARTG 5710	Design for Dignity	

ARTG 6310	Design for Behavior and Experience
ARTG 6330	Information Design Mapping Strategies
ARTG 6555	Graphic Design Synthesis
EXRE 5020	Developing Extended Realities (XR)
EXRE 5030	Designing Extended Realities (XR)
JRNL 6341	Telling Your Story with Data

Program Credit/GPA Requirements

60 total semester hours required
Minimum 3.000 GPA required

Plan of Study
Sample Plans of Study

TWO YEARS, OPTIONAL SUMMER CO-OP

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
ARTG 5100		4 ARTG 5120		4 Co-op or vacation	0
ARTG 5110		4 ARTG 5330		4	
ARTG 5310		4 ARTG 6100		4	
ARTG 5320		4 ARTG 6110		4	
		16		16	0
Year 2					
Fall	Hours	Spring	Hours		
ARTG 5710		4 ARTG 7910		4	
ARTG 6700		4 ARTG 7990		4	
ARTG 7100		4 Elective		4	
Elective		4			
		16		12	

Total Hours: 60

THREE YEARS, CO-OP IN FALL

Year 1					
Fall	Hours	Spring	Hours		
ARTG 5100		4 ARTG 5120			4
ARTG 5110		4 ARTG 5330			4
ARTG 5310		4 ARTG 6100			4
Elective		4 ARTG 6110			4
		16			16
Year 2					
Fall	Hours	Spring	Hours		
ARTG 5320		4 ARTG 7910			4
Co-op		0 ARTG 7990			4-8
		Elective			4
		4			12-16
Year 3					
Fall	Hours				
ARTG 5710		4			
ARTG 6700		4			
ARTG 7100		4			
		12			

Total Hours: 60-64

THREE YEARS, CO-OP IN SPRING

Year 1			
Fall	Hours	Spring	Hours
ARTG 5100		4 ARTG 5120	4
ARTG 5110		4 ARTG 5330	4
ARTG 5310		4 ARTG 6100	4
ARTG 5320		4 ARTG 6110	4
		16	16
Year 2			
Fall	Hours	Spring	Hours
ARTG 5710		4 Co-op	0
Elective		4	
		8	0
Year 3			
Fall	Hours	Spring	Hours
ARTG 6700		4 ARTG 7910	4
ARTG 7100		4 ARTG 7990	4
		Elective	4
		8	12

Total Hours: 60**THREE YEARS, TWO CO-OPS**

(Research co-op track)

Year 1			
Fall	Hours	Spring	Hours
ARTG 5100		4 ARTG 5120	4
ARTG 5110		4 ARTG 5330	4
ARTG 5310		4 ARTG 6100	4
ARTG 5320		4 ARTG 6110	4
		16	16
Year 2			
Fall	Hours	Spring	Hours
ARTG 5710		4 Co-op ²	0
Co-op ¹		0	
		4	0
Year 3			
Fall	Hours	Spring	Hours
ARTG 6700		4 ARTG 7910	4
ARTG 7100		4 ARTG 7990	4
Elective		4 Elective	4
		12	12

Total Hours: 60

¹ The second co-op must be a research-oriented co-op related to the thesis after completion of Design Studio 3: Synthesis (ARTG 6700) with the permission of the program coordinator.

Experience Design, MS (Boston)

The Master of Science in Experience Design embraces research-driven design thinking for entrepreneurship, innovation, and other areas, preparing students to be vital contributors and leaders at the intersection of innovation and design.

Experience design is a holistic and integrative approach to design that utilizes investigation into the human experience in specific situations to improve its quality, given an understanding of human goals, needs, and desires. For example, in the context of healthcare, an experience designer does

not focus on the design of any one technology product, information system, or physical space. Instead, the designer is charged with understanding and improving the overall sequence of events that impact the patient before and during a hospital stay as well as through follow-up care.

The experience design program moves beyond design thinking to produce outcomes that demonstrate the value of human-centered research and design methods. It draws on findings from a range of professional and scholarly disciplines (including business, psychology, human-computer interaction, engineering, cybernetics) to understand and shape specific situations. It extends across many industries and aspects of life: healthcare, technology, services, travel, education, entertainment, shopping, dining, and the nature of work itself.

Through examining how people behave in a real context in relation to emerging technologies, the Master of Science in Experience Design allows graduates from design and related disciplines (such as communications, computer science, business, architecture, art, journalism, humanities, and the social sciences) to gain knowledge and experience in the design competencies. To accomplish these goals, students study how to invoke cooperation, collaboration, and integration across disciplines and practices.

The Master of Science in Experience Design seeks to prepare students to be vital contributors and leaders of professional experience design teams where technological innovation intersects with design. Successful graduates should be able to analyze how people undergo real-world situations, enabling them to enrich experience by orchestrating new design-driven relationships. They will be equipped with the skills to identify shortcomings as well as opportunities for improved engagement between systems and elements—virtual or physical—with the humans who encounter them.

The MS degree is intended for graduate students from related fields—media, design, communications, data science, and more—who would like to acquire competencies in experience design to complement their skills and address their professional needs. Embedded in the course offering of our Master of Fine Arts in Experience Design (p. 211) program, students in the MS program will have the opportunity to join MFA students for activities such as attending guest lectures and workshops.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ARTG 5120	Research Methods for Design	4
ARTG 5600	Experience Design Studio 1: Principles	4
ARTG 5610	Design Systems	4
ARTG 5620	Notational Systems for Experience	4
ARTG 6310	Design for Behavior and Experience	4
ARTG 6600	Experience Design Studio 2: Group and Interpersonal	4

Electives

Code	Title	Hours
Complete two elective courses (4 credits each), such as these, in consultation with your advisor; multiple completions of ARTG 5000 may apply toward the elective requirement; other electives may be chosen in consultation with the program coordinator):		8
ARTG 5000	Topics in Design	
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics for Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5640	Prototyping for Experience Design	
ARTG 5710	Design for Dignity	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics of Design	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Year 1			
Fall	Hours	Spring	Hours
ARTG 5120		4 ARTG 5610	4
ARTG 5600		4 ARTG 6310	4

ARTG 5620	4 ARTG 6600	4
Elective	4 Elective	4
16		16

Total Hours: 32

*Students may opt to do a graduate co-op. Co-op does not count toward credits required for the degree.

Game Science and Design, MS (Boston)

The Master of Science (MS) in Game Science and Design is a program that seeks to give students a comprehensive understanding of how successful game products are created in a player-centric environment. Successful graduates who wish to become professional game developers or game user research experts should be able to collaborate effectively in this dynamic and burgeoning field of practice and research. Focusing on the science of game development, students have an opportunity to learn the design and technological skills needed to build a game and develop a deep understanding of playability and analytics that makes products successful in an increasingly competitive marketplace.

The game industry has expanded to include social and mobile gaming; augmented and virtual reality; as well as games in health, education, and training. Rapid innovations are happening in player psychology, middleware, graphics and authoring tools, game mechanics, and artificial intelligence and narrative techniques. It has become an increasingly competitive space.

The selectiveness of the industry and the diversity of the skills required mean that students seeking entry need both broad and deep skills. As an emergent industry using diverse technology and collaborative practices, the game industry needs professionals with interdisciplinary skill sets who can blend knowledge about development with knowledge about evaluation methods and players' behavior and psychology.

Jointly offered by Northeastern's College of Arts, Media and Design and Khoury College of Computer Sciences (<https://www.khoury.northeastern.edu/>), the **Master of Science in Game Science and Design** is a one-of-a-kind interdisciplinary program that seeks to prepare students to meet this need by weaving together science and design. This is a two-year, 34-semester-hours program.

All admitted students will be assigned to an advisor who will help them select a pathway with a coherent set of electives depending on their career goals. The advisor will also monitor their progress through the master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
GSND 5122	Business Models in the Game Industry	1
GSND 5130	Mixed Research Methods for Games	4
Thesis		
Students complete Games Project, then select either Thesis or a second completion of Games Project, in consultation with the program coordinator.		
GSND 7995	Games Project	4
<i>Thesis Conclusion</i>		
Complete an additional 4 Semester Hours from the following:		4
GSND 7990	Thesis	
GSND 7995	Games Project	

Core Electives

Code	Title	Hours
Game Design		
Complete one of the following:		4
GSND 6000	Advanced Topics in Game Design	
GSND 6225	Applied Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
Game Science		
Complete one of the following:		4

GSND 6001	Advanced Topics in Game Science
GSND 6320	Psychology of Play
GSND 6340	Biometrics of Design
GSND 6350	Data-Driven Game Design

Other Electives

Code	Title	Hours
Complete any two (8 Semester Hours) of the following courses listed.		8

If ARTG 5000 or GSND 6000 or GSND 6001 is completed more than once, the additional completions may be allowed toward the electives.

Elective courses outside of CAMD are subject to availability and registration policy of the home college.

Science

CS 5340	Computer/Human Interaction
PSYC 4612	Laboratory in Cognition

Programming

CS 5150	Game Artificial Intelligence
CS 5850	Building Game Engines
GSND 6460	Generative Game Design

Art

ARTG 5000	Topics in Design
ARTG 5100	Information Design Studio 1: Principles
ARTG 5130	Visual Communication for Information Design
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar

Extended Realities

EXRE 5010	Immersive Media: Extended Realities (XR) History, Theory, and Impact
EXRE 5011	Seminar for EXRE 5010
EXRE 5020	Developing Extended Realities (XR)
EXRE 5030	Designing Extended Realities (XR)

Other

ARTG 5310	Visual Cognition
ARTG 5330	Visualization Technologies 1: Fundamentals
ARTG 5610	Design Systems
ARTG 5640	Prototyping for Experience Design
ARTG 6310	Design for Behavior and Experience
CS 5520	Mobile Application Development
CS 5610	Web Development
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5302	Information Design and Visual Analytics
JRNL 6341	Telling Your Story with Data

Program Credit/GPA Requirements

34 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Sample Plan of Study

TWO YEARS, ONE (OPTIONAL) CO-OP

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
GSND 5110		4 Elective		4 Co-op (optional)	0
GSND 5111		1 Elective		4	
GSND 5130		4			
		9			0
					8
					0

Year 2			
Fall	Hours	Spring	Hours
GSND 5122		1 GSND 7990 or 7995	4
GSND 7995		4 Elective	4
Elective		4	
		9	8
Total Hours: 34			

Game Science and Design, MS (Oakland)

The Master of Science (MS) in Game Science and Design is a program that seeks to give students a comprehensive understanding of how successful game products are created in a player-centric environment. Successful graduates who wish to become professional game developers or game user research experts should be able to collaborate effectively in this dynamic and burgeoning field of practice and research. Focusing on the science of game development, students have an opportunity to learn the design and technological skills needed to build a game and develop a deep understanding of playability and analytics that makes products successful in an increasingly competitive marketplace.

The game industry has expanded to include social and mobile gaming; augmented and virtual reality; as well as games in health, education, and training. Rapid innovations are happening in player psychology, middleware, graphics and authoring tools, game mechanics, and artificial intelligence and narrative techniques. It has become an increasingly competitive space.

The selectiveness of the industry and the diversity of the skills required mean that students seeking entry need both broad and deep skills. As an emergent industry using diverse technology and collaborative practices, the game industry needs professionals with interdisciplinary skill sets who can blend knowledge about development with knowledge about evaluation methods and players' behavior and psychology.

Jointly offered by Northeastern's College of Arts, Media and Design and Khoury College of Computer Sciences (<https://www.khoury.northeastern.edu/>), the **Master of Science in Game Science and Design** is a one-of-a-kind interdisciplinary program that seeks to prepare students to meet this need by weaving together science and design. This is a two-year, 34-semester-hours program.

All admitted students will be assigned to an advisor who will help them select a pathway with a coherent set of electives depending on their career goals. The advisor will also monitor their progress through the master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
GSND 5122	Business Models in the Game Industry	1
GSND 5130	Mixed Research Methods for Games	4
Thesis		
Students complete Games Project, then select either Thesis or a second completion of Games Project, in consultation with the program coordinator.		
GSND 7995	Games Project	4
Thesis Conclusion		
Complete an additional 4 Semester Hours from the following:		4
GSND 7990	Thesis	
GSND 7995	Games Project	

Core Electives

Code	Title	Hours
Game Design		
Complete one of the following:		4
GSND 6000	Advanced Topics in Game Design	
GSND 6225	Applied Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	

Game Science

Complete one of the following:		4
GSND 6001	Advanced Topics in Game Science	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	

Other Electives

Code	Title	Hours
Complete any two (8 Credit Hours) of the following courses listed.		8

If ARTG 5000 or GSND 6000 or GSND 6001 is completed more than once, the additional completions may be allowed toward the electives.

Elective courses outside of CAMD are subject to availability and registration policy of the home college.

Science		
CS 5340	Computer/Human Interaction	
PSYC 4612	Laboratory in Cognition	
Programming		
CS 5150	Game Artificial Intelligence	
CS 5850	Building Game Engines	
GSND 6460	Generative Game Design	
Art		
ARTG 5000	Topics in Design	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5130	Visual Communication for Information Design	
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
Extended Realities		
EXRE 5010	Immersive Media: Extended Realities (XR) History, Theory, and Impact	
EXRE 5011	Seminar for EXRE 5010	
EXRE 5020	Developing Extended Realities (XR)	
EXRE 5030	Designing Extended Realities (XR)	
Other		
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5610	Design Systems	
ARTG 5640	Prototyping for Experience Design	
ARTG 6310	Design for Behavior and Experience	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5302	Information Design and Visual Analytics	
JRNL 6341	Telling Your Story with Data	

Program Credit/GPA Requirements

34 total semester hours required

Minimum 3.000 GPA required

Plan of Study**Sample Plan of Study****TWO YEARS, ONE (OPTIONAL) CO-OP**

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
GSND 5110 and GSND 5111		5 Elective		4 Co-op (optional)	0

GSND 5130	4	Elective	4	
	9		8	0
Year 2				
Fall	Hours	Spring	Hours	
GSND 5122		1 GSND 7990 or 7995	4	
GSND 7995		4 Elective	4	
Elective		4		
	9		8	
Total Hours: 34				

Information Design and Data Visualization, MS (Boston)

The Master of Science in Information Design and Data Visualization is a two-semester research- and analysis-oriented program focusing on visual interfaces to communicate and explore digital information. Graduates may become professional information designers and data visualization experts able to collaborate effectively in this dynamic and burgeoning field of practice and research, prepared to work in data-driven areas including design, technology, business, health, education, and public institutions. The curriculum is designed to train students in design principles, critical inquiry, and the analytical and creative practices needed to assume leadership roles in an evolving interdisciplinary field. Coursework focuses on the translation of data and information into visual languages and the integration of theoretical, cognitive, and technical aspects of visualizations that engage a broad range of audiences. From this master's program, students have multiple options to expand their advanced studies along diverse avenues, including adding graduate certificates in related topics such as user analytics, data analytics, experience design, and cultural entrepreneurship; engaging in co-op opportunities; and applying to proceed academically into a terminal Master of Fine Arts degree.

To learn more visit the Information Design and Data Visualization (<https://camd.northeastern.edu/programs/information-design-and-data-visualization-ms/>) page.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ARTG 5100	Information Design Studio 1: Principles	4
ARTG 5120	Research Methods for Design	4
ARTG 5310	Visual Cognition	4
ARTG 5320	Statistics for Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6100	Information Design Studio 2: Dynamic Mapping and Models	4
ARTG 6110	Information Design Theory and Critical Thinking	4

Elective

Code	Title	Hours
Complete one of the following:		4
ARTG 5000	Topics in Design	
ARTG 5110	Information Design History	
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
ARTG 5120	Research Methods for Design	
ARTG 5130	Visual Communication for Information Design	
ARTG 5430	Visualization Technologies 2: Advanced Practices	
ARTG 5710	Design for Dignity	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	
ARTG 6555	Graphic Design Synthesis	
ARTG 7890	Thesis	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Plan of Study**Sample Plans of Study****TWO SEMESTERS, NO CO-OP¹**

Year 1			
Fall	Hours	Spring	Hours
ARTG 5100		4 ARTG 5120	4
ARTG 5310		4 ARTG 5330	4
ARTG 5320		4 ARTG 6100	4
Elective		4 ARTG 6110	4
		16	16

Total Hours: 32¹ Summer co-op is optional in consultation with the program coordinator.**FOUR SEMESTERS, NO CO-OP²**

Year 1			
Fall	Hours	Spring	Hours
ARTG 5100		4 ARTG 5310	4
ARTG 5320		4 ARTG 6100	4
		8	8
Year 2			
Fall	Hours	Spring	Hours
ARTG 5330		4 ARTG 6110	4
Elective		4 ARTG 5120	4
		8	8

Total Hours: 32² Students can choose to do a co-op in the summer between year 1 and year 2.**Information Design and Data Visualization, MS (Vancouver)**

The Master of Science in Information Design and Data Visualization is a two-semester research- and analysis-oriented program focusing on visual interfaces to communicate and explore digital information. Graduates may become professional information designers and data visualization experts able to collaborate effectively in this dynamic and burgeoning field of practice and research, prepared to work in data-driven areas including design, technology, business, health, education, and public institutions. The curriculum is designed to train students in design principles, critical inquiry, and the analytical and creative practices needed to assume leadership roles in an evolving interdisciplinary field. Coursework focuses on the translation of data and information into visual languages and the integration of theoretical, cognitive, and technical aspects of visualizations that engage a broad range of audiences. From this master's program, students have multiple options to expand their advanced studies along diverse avenues, including adding graduate certificates in related topics such as user analytics, data analytics, experience design, and cultural entrepreneurship; engaging in co-op opportunities; and applying to proceed academically into a terminal Master of Fine Arts degree.

To learn more visit the Information Design and Data Visualization (<https://camd.northeastern.edu/program/information-design-and-visualization/>) page.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ARTG 5100	Information Design Studio 1: Principles	4
ARTG 5120	Research Methods for Design	4
ARTG 5310	Visual Cognition	4

ARTG 5320	Statistics for Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6100	Information Design Studio 2: Dynamic Mapping and Models	4
ARTG 6110	Information Design Theory and Critical Thinking	4
ARTG 7890	Thesis	4

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Sample Plans of Study

TWO SEMESTERS, NO CO-OP¹

Year 1

Fall	Hours	Spring	Hours
ARTG 5100		4 ARTG 5330	4
ARTG 5120		4 ARTG 6100	4
ARTG 5310		4 ARTG 6110	4
ARTG 5320		4 ARTG 7890	4
		16	16

Total Hours: 32

¹ Summer co-op is optional in consultation with the program coordinator.

FOUR SEMESTERS, NO CO-OP²

Year 1

Fall	Hours	Spring	Hours
ARTG 5120		4 ARTG 5100	4
ARTG 5310		4 ARTG 5320	4
		8	8

Year 2

Fall	Hours	Spring	Hours
ARTG 5330		4 ARTG 6110	4
ARTG 6100		4 ARTG 7890	4
		8	8

Total Hours: 32

² Students can choose to do a co-op in the summer between year 1 and year 2.

Media Innovation and Data Communication, MS (Boston)

The Master of Science will offer a distinctive approach to knowledge and innovation in media fields, an approach rooted in the rigor of professional journalism—with its emphasis on empowered knowledge acquisition, empirical verification, and storytelling in the public interest—but one keenly attuned to emerging, data-driven technologies and their potential. The program capitalizes on the revolution in data storytelling and computational methods in media work; the rapid evolution in video, animation, and augmented/virtual reality technologies; and social networks and digital analytics. Our graduates will be prepared to become leaders in media firms and outlets engaged with cutting-edge technologies and innovative digital startups, as well as a broad range of media and communications organizations across the rapidly evolving digital economy.

Program Requirements

Core Requirements

Code	Title	Hours
ARTG 5330	Visualization Technologies 1: Fundamentals	4
JRNL 6306	Media Innovation Studio 1	4
JRNL 6307	Media Innovation Studio 2	4

JRNL 6340	Fundamentals of Digital Journalism	4
JRNL 6341	Telling Your Story with Data	4

Electives

Code	Title	Hours
Students must complete 16 semester hours.		16
<i>Note: Courses in other disciplines may be taken in consultation with your faculty advisor. No more than two courses outside of CAMD may be taken.</i>		

Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

Plan of Study
Three Semesters and No Co-op

Year 1					
Fall	Hours	Spring	Hours		
JRNL 6340		4 JRNL 6306			4
JRNL 6341		4 ARTG 5330			4
Elective		4 Elective			4
			12	12	
Year 2					
Fall	Hours				
JRNL 6307		4			
Elective		4			
Elective		4			
			12		
Total Hours: 36					

Four Semesters and One Six-Month Co-op

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 6340		4 JRNL 6306		4 Vacation		Co-op	0
JRNL 6341		4 ARTG 5330		4			
Elective		4 Elective		4			
		12		12		0	0
Year 2							
Fall	Hours	Spring	Hours				
JRNL 6307		4 Elective		4			
Co-op		0 Elective		4			
		4		8			
Total Hours: 36							

Three Semesters and One Summer Co-op

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
JRNL 6340		4 JRNL 6306		4 Co-op	0
JRNL 6341		4 ARTG 5330		4	
Elective		4 Elective		4	
		12		12	0
Year 2					
Fall	Hours				
JRNL 6307		4			

Elective	4
Elective	4
	12
Total Hours: 36	

Experience Design, Graduate Certificate (Boston)

The Graduate Certificate in Experience Design embraces research-driven design thinking for entrepreneurship, innovation, and other areas, preparing students to be vital contributors and leaders at the intersection of innovation and design.

Experience design is a holistic and integrative approach to design that utilizes investigation into the human experience in specific situations to improve its quality, given an understanding of human goals, needs, and desires. For example, in the context of healthcare, an experience designer does not focus on the design of any one technology product, information system, or physical space. Instead, the designer is charged with understanding and improving the overall sequence of events that impact the patient before and during a hospital stay as well as through follow-up care.

The Graduate Certificate in Experience Design moves beyond design thinking to produce outcomes that demonstrate the value of human-centered research and design methods. It draws on findings from a range of professional and scholarly disciplines (including business, psychology, human-computer interaction, engineering, cybernetics) to understand and shape specific situations. It extends across many industries and aspects of life: healthcare, technology, services, travel, education, entertainment, shopping, dining, and the nature of work itself.

Through examining how people behave in a *real* context in relation to emerging technologies, the Graduate Certificate in Experience Design allows working professionals or graduates from design and related disciplines (such as communications, computer science, business, architecture, art, journalism, humanities, and the social sciences) to gain knowledge and experience in the design competencies. To accomplish these goals, students need to learn how to invoke cooperation, collaboration, and integration across disciplines and practices.

The Graduate Certificate in Experience Design is designed to prepare students to be vital contributors and leaders of professional experience design teams where technological innovation intersects with design. Successful graduates will be able to analyze how people undergo real-world situations, enabling them to enrich experience by orchestrating new design-driven relationships. They will be equipped with the skills to identify shortcomings as well as opportunities for improved engagement between systems and elements—virtual or physical—with the humans who encounter them.

The certificate is intended for practitioners and graduate students from related fields—media, design, communications, data science, and more—who would like to acquire competencies in experience design to complement their skills and address their professional needs. Embedded in the course offering of our Master of Fine Arts in Experience Design (p. 211) program, students in the certificate program will have the opportunity to join MFA students for activities such as attending guest lectures and workshops.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ARTG 5610	Design Systems	4
ARTG 5620	Notational Systems for Experience	4
ARTG 6310	Design for Behavior and Experience	4

Elective

Code	Title	Hours
Complete 4 semester hours of 5000- to 6000-level course work in the following subject area:		4
ARTG		

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Game Experience Design, Graduate Certificate (Boston)

The Graduate Certificate in Game Experience Design offers training in the skills, tools, and methods needed to design successful game products, including social and mobile gaming; augmented and virtual reality; as well as games for health, education, and science. Students gain hands-on experience in designing games under faculty with industry expertise in game design. Game design courses focus on innovation; societal impact; and player-centric, experiential design approaches. The Graduate Certificate in Game Experience Design is a one-year, 17-semester-hour program. Upon

successful completion of the certificate, students can opt to apply to the Master of Science in Game Science and Design and, if accepted, may apply credits gained through the certificate to requirements of that degree program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	5
GSND 5130	Mixed Research Methods for Games	4

Electives

Code	Title	Hours
Complete 8 semester hours from the following (multiple completions of ARTG 5000 or GSND 6000 may apply to the elective requirement):		8
ARTG 5000	Topics in Design	
ARTG 5640	Prototyping for Experience Design	
GSND 6000	Advanced Topics in Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6460	Generative Game Design	

Program Credit/GPA Requirements

17 total semester hours required

Minimum 3.000 GPA required

Game Science, Graduate Certificate (Boston)

The Graduate Certificate in Game Science offers training in assessing, tracking, and analyzing player experience using game analytics methods and techniques, biometrics, and research methods including interviews and surveys. Students gain hands-on experience with these methods and techniques under faculty guidance with industry experts in game science. The game development process has shifted from “design, develop, release” to “design, develop, release, and continuously fine-tune based on user data.” Game science plays a critical role in this new process. The Graduate Certificate in Game Science is a one-year, 17-semester-hour program. Upon successful completion of the certificate, students can opt to apply to the Master of Science in Game Science and Design and, if accepted, transfer credits gained through the certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	5
GSND 5130	Mixed Research Methods for Games	4

Electives

Code	Title	Hours
Complete two of the following (multiple completions of ARTG 5000 or GSND 6001 may apply toward the elective requirement):		8
ARTG 5000	Topics in Design	
GSND 6001	Advanced Topics in Game Science	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	

Program Credit/GPA Requirements

17 total semester hours required

Minimum 3.000 GPA required

Information Design and Visualization, Graduate Certificate (Boston)

The Graduate Certificate in Information Design and Visualization focuses on the data-driven analytical and visual design of information, preparing students to communicate visually while engaging advanced data analytics to produce meaningful information environments.

Graduates of the certificate program are professionals who are prepared to tackle new information communication challenges and communicate and collaborate with researchers in a variety of fields, as well as stakeholders and the public. Throughout the course of the program, students master how to think visually, while also learning how to produce effective, meaningful visual information from various sources of data.

The certificate is intended for practitioners and graduate students from related fields—media, design, communications, data science, and more—who would like to acquire competencies in information design and data visualization to complement their skills and address their professional needs. Embedded in the course offering of our Master of Fine Arts in Information Design and Data Visualization (p. 213) program, students in the certificate program have the opportunity to join MFA students for activities such as attending guest lectures and workshops.

To learn more, visit the Information Design and Data Visualization (<https://camd.northeastern.edu/visualization/>) portal.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ARTG 5310	Visual Cognition	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4

Electives

Code	Title	Hours
Complete two of the following (multiple completions of ARTG 5000 may apply toward the elective requirement):		8
ARTG 5000	Topics in Design	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5110	Information Design History	
ARTG 5130	Visual Communication for Information Design	
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics for Design	
ARTG 5430	Visualization Technologies 2: Advanced Practices	
ARTG 5710	Design for Dignity	
ARTG 6100	Information Design Studio 2: Dynamic Mapping and Models	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	
ARTG 6555	Graphic Design Synthesis	

ARTG 5000 or 6000 level course

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Product Management, Graduate Certificate (Boston)

The Graduate Certificate in Product Management is designed for students with undergraduate degrees in a wide range of fields—including computer science, engineering, economics, business administration, design, and psychology—who want to build the skills necessary for success as product managers. This certificate equips students with the expertise to excel in this dynamic field, whether they are early career professionals, transitioning into product roles, or looking to differentiate themselves in a competitive job market. The program provides a flexible, cost-effective alternative to a full MS program while offering hands-on learning experiences.

Curriculum and Structure

This interdisciplinary certificate offers a structured yet adaptable curriculum that balances foundational knowledge with practical, industry-relevant skills.

The program consists of four courses (12–13 semester hours total):

- Three core courses covering fundamental concepts across key product management functions
- One experiential course (1 credit) providing hands-on learning opportunities tailored to students’ backgrounds and career goals in product management

This certificate allows students to gain real-world experience, develop in-demand skills, and enhance their career opportunities within a streamlined, flexible structure.

Admissions and College Affiliation

Students are admitted to the certificate program through one of the following colleges and follow the academic policies of their home college:

- College of Arts, Media and Design
- College of Engineering
- D’Amore-McKim School of Business
- Office of the Provost and College of Professional Studies¹

This certificate provides a fast, flexible, and practical pathway for students looking to build expertise in product management while benefiting from Northeastern University’s strong academic and professional support network.

¹ Program Structure and Transition

- For the 2025–2026 academic year, the Graduate Certificate in Product Management is being offered as a collaboration between the College of Professional Studies and the Office of the Provost. During this period, students will follow Northeastern’s graduate academic calendar and be governed by the academic policies and procedures outlined in the university’s *Graduate Catalog*.
- While designated under the Office of the Provost, students will receive full academic and student support services from the College of Professional Studies including academic advising, co-op and career advising, and access to the International Tutoring Center.
- Beginning in the 2026–2027 academic year, the certificate program will transition fully to the College of Professional Studies. At that time, students will be officially designated under CPS in the academic system of record and governed by its academic policies as outlined in the university’s *Graduate Catalog*.

Program Requirements
Requirements

Code	Title	Hours
Fundamental Concepts		
ARTG 5600	Experience Design Studio 1: Principles	4
EMGT 6750	Advanced Product Management	3-4
or PDM 6000	Foundations of Product Management	
INNO 6409	Innovation Portfolio Management	4
Experiential Course		
Complete one of the following:		1
ARTG 5540	Design and Product Management	
EMGT 6760	Technical Product Management	
INNO 6411	Product Innovation Management	
PDM 6940	Product Analytics	

Program Credit/GPA Requirement

12 total semester hours required (additional hours may be required based on student choice of course options)
Minimum 3.000 GPA required

Maria Elena Villar, PhD
 Chair
 617.373.5517
 commstudies@northeastern.edu

Kristopher Cannon, PhD
 Associate Chair
 617.373.5517
 commstudies@northeastern.edu

Welcome to the graduate program at Northeastern University's Department of Communication Studies. Our department offers one degree: the Master of Science in Media, Technology, and Ethics.

Through a combination of empirical analysis and problem solving, the Master of Science in Media, Technology, and Ethics program enables students to wrestle with the ethical and communicative dimensions of new technology. Its interdisciplinary approach highlights the need to continually think about technological developments in the context of democracy, politics, and civic engagement through the situated analysis of new developments in technology, data, and communication practices. The program examines the ethical, communicative, and political issues raised by data-driven technologies as well as the foundational knowledge, intellectual creativity, and practical skills to address them.

Programs

Master of Science (MS)

- Media, Technology, and Ethics, MS (Boston) (p. 229)

Media, Technology, and Ethics, MS (Boston)

Through a combination of empirical analysis and problem solving, the Master of Science in Media, Technology, and Ethics program enables students to wrestle with the ethical and communicative dimensions of new technology. Its interdisciplinary approach highlights the need to continually think about technological developments in the context of democracy, politics, and civic engagement through the situated analysis of new developments in technology, data, and communication practices.

The program examines the ethical, communicative, and political issues raised by data-driven technologies as well as the foundational knowledge, intellectual creativity, and practical skills to address them. Possible career paths include designers, policymakers, and thought leaders in the wide range of professions that involve working closely with digital technologies from healthcare to marketing and education to law. In addition to acquiring professional qualifications, graduates may continue their education in PhD programs in media studies, communication studies, and other related fields, should they choose to do so.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Media, Technology, and Ethics Core

Code	Title	Hours
Required Courses		
COMM 5250	Communication and Technology Research Methods	4
MSCR 5300	Media and Technology Ethics	4
Data and Technology Courses		
Complete three of the following:		12
MSCR 6310	Critical Data Studies	
MSCR 6320	Digital Technologies and Global Society	
MSCR 6330	Democracy, Technology, and Equality	
MSCR 6340	Race and Technology	

Experiential Concentrations

Complete one of the following options:

- Applied Research (p. 230)
- Civic Engagement and Policy (p. 230)
- Data Visualization (p. 230)
- Game Design (p. 230)
- Information Ethics (p. 230)
- Media Content (p. 231)

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

CONCENTRATION IN APPLIED RESEARCH

Code	Title	Hours
Required Courses		
COMM 6995	Research Project	4
INAM 6360	Ethnographic Methods and the Arts	4
Elective		
Any 5000- or 6000-level course approved by advisor		4

CONCENTRATION IN CIVIC ENGAGEMENT AND POLICY

Code	Title	Hours
Required Course		
JRNL 5400	Media and Advocacy in Theory and Practice	4
Electives		
Complete two of the following:		8
COMM 6320	Political Communication	
COMM 6500	Environmental Issues, Communication, and Media	
INAM 6200	Topics in Communication Strategies	
JRNL 5480	Research for Media Strategy	

CONCENTRATION IN DATA VISUALIZATION

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
Elective		
Complete one of the following:		4
ARTG 5310	Visual Cognition	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN GAME DESIGN

Code	Title	Hours
Required Course		
GSND 5110	Game Design and Analysis	4
Electives		
Complete two of the following:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6460	Generative Game Design	

CONCENTRATION IN INFORMATION ETHICS

Code	Title	Hours
Complete three of the following:		12
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MEDIA CONTENT

Code	Title	Hours
Required Course		
MSCR 6100	Digital Media: Theory and Practice	4
Electives		
Complete two of the following:		8
COMM 5510	Technology and Strategic Communication	
JRNL 6306	Media Innovation Studio 1	
JRNL 6307	Media Innovation Studio 2	
JRNL 6341	Telling Your Story with Data	

School of Journalism

Website (<https://camd.northeastern.edu/journalism/>)

Jonathan Kaufman, MA

Professor and Director

617.373.3236

Welcome to the graduate programs at Northeastern University's School of Journalism. Our school offers three degrees: a Master of Arts in Journalism, a Master of Science in Media Innovation and Data Communication, and a Master of Science in Media Advocacy.

The Master of Arts in Journalism degree is designed to merge traditional journalism with the latest technology. Students new to the field or those with experience can choose one of two tracks—professional journalism or media innovation—to prepare them for the challenges faced by legacy and new media in the digital age. The Master of Science in Media Innovation and Data Communication degree focuses on new forms of data-driven media practice, creative digital storytelling, and strategies for fostering innovation in media fields. The Master of Science in Media Advocacy degree is designed to teach strategic advocacy skills and prepare graduates to succeed as resilient, media-empowered citizens in a global society. Moreover, these programs offer students hands-on training in preparation for careers in reporting, editing, multimedia design and production, social media, and data journalism.

As part of Northeastern's College of Arts, Media and Design, our graduate students are also part of an interdisciplinary and creative community. Our core curriculum is supplemented by electives that take advantage of course offerings from within our college and from other colleges in the university. And with our experiential education opportunities and outstanding co-op program, students do not have to wait until after graduation to begin developing skills as reporters, media advocates, or public relations professionals.

It is our goal to help you put your passion into practice. To that end, our graduate programs afford students the opportunity to study in Boston with a small and dedicated faculty of specialists with years of experience and extensive contacts in the media world.

Programs**Master of Arts (MA)**

- Journalism (p. 231) (Boston)

Master of Science (MS)

- Media Advocacy (p. 232) (Boston)
- Media Innovation and Data Communication (p. 223) (Boston)
- Media, Technology, and Ethics (p. 229) (Boston)

Journalism, MA (Boston)

The School of Journalism offers a dynamic Master of Arts degree that seeks to prepare students for the challenges faced by media organizations in the digital age. The degree trains students to become rigorous, ethical, and creative news reporters, editors, and content producers, as well as social media managers and video/audio specialists.

Both students new to the field and those with some experience can choose courses tailored to help them thrive in particular subject areas, such as criminal justice or climate change, or around specific technologies, such as podcasting or data visualization. Our programs are designed to merge the skills of professional journalism with knowledge of the latest information technologies.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
JRNL 6200	Enterprise Reporting 1	4
JRNL 6201	Enterprise Reporting 2	4
JRNL 6202	Perspectives on News Media Ethics and Diversity	4
JRNL 6340	Fundamentals of Digital Journalism	4

Electives

Code	Title	Hours
Complete 20 semester hours in the following range:		20
JRNL 5309 to JRNL 7976		
Courses from other disciplines may be taken in consultation with your faculty advisor.		
No more than two courses outside of CAMD may be taken.		

Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

Plan of Study**Sample Plan of Study: Two Years with Co-op in Summer Second Half**

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 6100		1 JRNL 6201		4 Vacation		0 Co-op	0
JRNL 6200	4	JRNL 6202		4			
JRNL 6340	4	Elective 2		4			
Elective 1	4						
	13		12		0		0
Year 2							
Fall	Hours	Spring	Hours				
Co-op	0	Elective 3	4				
		Elective 4	4				
		Elective 5	4				
	0		12				
Total Hours: 37							

Media Advocacy, MS (Boston)

The Master of Science in Media Advocacy places particular focus on developing direct and indirect advocacy skills: that is, to influence government decision makers directly and to change minds indirectly through shifting public opinion. The program uniquely combines grounding in governmental structures and the legal system with sophisticated training in the latest communication techniques including social media, web communications, and videography, as well as data analytics and data-driven storytelling. Successful graduates will be empowered to promote the public agenda of employers ranging from mission-driven organizations, such as the ACLU or the Sierra Club, to industry leaders, such as hospitals and technology companies, to lobbying and strategic communications groups and political consulting firms.

Program Requirements**Core Requirements**

Code	Title	Hours
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 5480	Research for Media Strategy	4
LW 6400	Law, Policy and Legal Argument	4
LW 7667	Law and Ethics of Advocacy	3

Electives

Code	Title	Hours
A minimum of 17 credits of electives is required. No more than 8 semester hours can be taken outside of the College of Arts, Media, and Design or the School of Law.		17

Complete a minimum of 4 semester hours of coursework from the College of Arts, Media, and Design. Choose from recommended focus areas of JRNL, ARTD, ARTG, COMM, and INAM (additional areas may be chosen in consultation with your adviser).

Complete a minimum of 5 semester hours of coursework from the School of Law.

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Sample One-and-a-Half Years with No Co-op

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 5400		4 JRNL 5480		4 Vacation		0 Vacation	0
LW 6400		4 Elective 2		3-4			
Elective 1		3-4 Elective 3		3-4			
11-12		10-12		0		0	
Year 2							
Fall	Hours						
LW 7667		3					
Elective 4		3-4					
Elective 5		3-4					
Elective 6		3-4					
12-15							
Total Hours: 33-39							

Media Innovation and Data Communication, MS (Boston)

The Master of Science will offer a distinctive approach to knowledge and innovation in media fields, an approach rooted in the rigor of professional journalism—with its emphasis on empowered knowledge acquisition, empirical verification, and storytelling in the public interest—but one keenly attuned to emerging, data-driven technologies and their potential. The program capitalizes on the revolution in data storytelling and computational methods in media work; the rapid evolution in video, animation, and augmented/virtual reality technologies; and social networks and digital analytics. Our graduates will be prepared to become leaders in media firms and outlets engaged with cutting-edge technologies and innovative digital startups, as well as a broad range of media and communications organizations across the rapidly evolving digital economy.

Program Requirements

Core Requirements

Code	Title	Hours
ARTG 5330	Visualization Technologies 1: Fundamentals	4
JRNL 6306	Media Innovation Studio 1	4
JRNL 6307	Media Innovation Studio 2	4
JRNL 6340	Fundamentals of Digital Journalism	4
JRNL 6341	Telling Your Story with Data	4

Electives

Code	Title	Hours
Students must complete 16 semester hours.		16

Note: Courses in other disciplines may be taken in consultation with your faculty advisor. No more than two courses outside of CAMD may be taken.

Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

Plan of Study
Three Semesters and No Co-op

Year 1			
Fall	Hours	Spring	Hours
JRNL 6340		4 JRNL 6306	4
JRNL 6341		4 ARTG 5330	4
Elective		4 Elective	4
		12	12
Year 2			
Fall	Hours		
JRNL 6307		4	
Elective		4	
Elective		4	
		12	

Total Hours: 36

Four Semesters and One Six-Month Co-op

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 6340		4 JRNL 6306		4 Vacation		Co-op	0
JRNL 6341		4 ARTG 5330		4			
Elective		4 Elective		4			
		12		12		0	0
Year 2							
Fall	Hours	Spring	Hours				
JRNL 6307		4 Elective		4			
Co-op		0 Elective		4			
		4		8			

Total Hours: 36

Three Semesters and One Summer Co-op

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
JRNL 6340		4 JRNL 6306		4 Co-op	0
JRNL 6341		4 ARTG 5330		4	
Elective		4 Elective		4	
		12		12	0
Year 2					
Fall	Hours				
JRNL 6307		4			
Elective		4			
Elective		4			
		12			

Total Hours: 36

Media, Technology, and Ethics, MS (Boston)

Through a combination of empirical analysis and problem solving, the Master of Science in Media, Technology, and Ethics program enables students to wrestle with the ethical and communicative dimensions of new technology. Its interdisciplinary approach highlights the need to continually think about technological developments in the context of democracy, politics, and civic engagement through the situated analysis of new developments in technology, data, and communication practices.

The program examines the ethical, communicative, and political issues raised by data-driven technologies as well as the foundational knowledge, intellectual creativity, and practical skills to address them. Possible career paths include designers, policymakers, and thought leaders in the wide range of professions that involve working closely with digital technologies from healthcare to marketing and education to law. In addition to acquiring professional qualifications, graduates may continue their education in PhD programs in media studies, communication studies, and other related fields, should they choose to do so.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Media, Technology, and Ethics Core

Code	Title	Hours
Required Courses		
COMM 5250	Communication and Technology Research Methods	4
MSCR 5300	Media and Technology Ethics	4
Data and Technology Courses		
Complete three of the following:		12
MSCR 6310	Critical Data Studies	
MSCR 6320	Digital Technologies and Global Society	
MSCR 6330	Democracy, Technology, and Equality	
MSCR 6340	Race and Technology	

Experiential Concentrations

Complete one of the following options:

- Applied Research (p. 230)
- Civic Engagement and Policy (p. 230)
- Data Visualization (p. 230)
- Game Design (p. 230)
- Information Ethics (p. 230)
- Media Content (p. 231)

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

CONCENTRATION IN APPLIED RESEARCH

Code	Title	Hours
Required Courses		
COMM 6995	Research Project	4
INAM 6360	Ethnographic Methods and the Arts	4
Elective		
Any 5000- or 6000-level course approved by advisor		4

CONCENTRATION IN CIVIC ENGAGEMENT AND POLICY

Code	Title	Hours
Required Course		
JRNL 5400	Media and Advocacy in Theory and Practice	4
Electives		
Complete two of the following:		8

COMM 6320	Political Communication
COMM 6500	Environmental Issues, Communication, and Media
INAM 6200	Topics in Communication Strategies
JRNL 5480	Research for Media Strategy

CONCENTRATION IN DATA VISUALIZATION

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
Elective		
Complete one of the following:		4
ARTG 5310	Visual Cognition	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN GAME DESIGN

Code	Title	Hours
Required Course		
GSND 5110	Game Design and Analysis	4
Electives		
Complete two of the following:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6460	Generative Game Design	

CONCENTRATION IN INFORMATION ETHICS

Code	Title	Hours
Complete three of the following:		12
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MEDIA CONTENT

Code	Title	Hours
Required Course		
MSCR 6100	Digital Media: Theory and Practice	4
Electives		
Complete two of the following:		8
COMM 5510	Technology and Strategic Communication	
JRNL 6306	Media Innovation Studio 1	
JRNL 6307	Media Innovation Studio 2	
JRNL 6341	Telling Your Story with Data	

Interdisciplinary Programs

Welcome to interdisciplinary graduate studies in the College of Arts, Media and Design. Here you'll find courses and programs that embrace shared dialogue and experiential learning across creative fields. These interdisciplinary doctoral programs, master's programs, and graduate certificates place collaboration at the core of their mission, integrating frameworks, methods, and practices to support students in developing truly innovative approaches and outcomes. Our interdisciplinary degree and certificate options provide a strong foundation of use-inspired, experientially informed coursework and research opportunities.

The PhD in Interdisciplinary Design and Media offers an innovative, globally aware, human-centered approach to advanced graduate study, focusing on practice-based research and scholarship applied to or conducted through making or creation.

The Master of Science in Arts Administration and Cultural Entrepreneurship and graduate certificate programs give students foundational to advanced training in the skills and techniques essential to leading arts and culture organizations today, combining the human literacies of collaboration and communication with the technical basis of arts organizational visioning, planning, and sustainable management.

The Master of Science in Urban Planning and Policy program is jointly offered between the college's School of Architecture and the School of Public Policy and Urban Affairs within the College of Social Sciences and Humanities. The curriculum provides a strong foundational knowledge base and allows specialization into the closely related areas of sustainable urban planning and contemporary approaches to urban policy for global cities.

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality. The College of Arts, Media and Design partners closely with Bouvé College of Health Sciences, the College of Engineering, the D'Amore-McKim School of Business, and Khoury College of Computer Sciences to offer additional concentrations that provide breadth and depth of knowledge.

Programs

Doctor of Philosophy (PhD)

- Interdisciplinary Design and Media (Boston) (p. 237)
- Network Science (Boston) (p. 241)

Master of Science (MS)

- Arts Administration and Cultural Entrepreneurship (Boston) (p. 246)
- Creative Collaboration and Multidisciplinary Design (Boston) (p. 248)
- Extended Realities (Boston)
- Extended Realities (Oakland)
- Urban Planning and Policy (Boston) (p. 254)

Graduate Certificate

- AI Applications (Boston) (p. 190)
- Arts Administration (Boston) (p. 259)
- Cultural Entrepreneurship (Boston) (p. 259)
- Product Management (Boston) (p. 192)

Interdisciplinary Design and Media, PhD (Boston)

The PhD provides a rigorous, globally aware, practice-based, and human-centered approach to advanced scholarship. It aims to cultivate researcher-designers with a versatile repertoire of methods and a passion for applying those skills to the emerging epistemic perspective of integrated human, technological, and data frameworks within creative collaboration across disciplinary boundaries. The degree is designed to attract entrepreneurial self-starters who seek to break ground and invent new fields through hybrid and integrated approaches to knowledge creation.

The PhD emphasizes four pillars of excellence within a research culture:

- Engaging with the nature of human experience through innovative, interdisciplinary approaches to design
- Investigating new forms of digital media and data-driven communication across diverse disciplines
- Articulating how creativity can embrace connections between artistic practices, innovation, entrepreneurship, and research
- Connecting with changing forms of technology and media to foster shared experiences and exchange within local and global communities

The PhD is unique in its focus on practice-based research or scholarship applied to or conducted through making or creation. This is an emerging area that has been applied internationally to a wide range of creative fields and industries, many of which are represented within the College of Arts, Media and Design: music, theatre, design, studio art, games, architecture, journalism, and others. It differs from other forms of knowledge creation in that it rigorously cultivates the creation of artifacts as a mode of producing new knowledge, theories, and methodologies. Practice-based research integrates fields such as creativity and cognition or human-computer interaction to understand how practice operates, to enact that knowledge in practical applications, and to use the acts of creation themselves as a research methodology. PhD students will be encouraged to conduct their research in—and in some cases create—"living labs" embedded in real-world contexts and through on- and off-campus research partnerships.

The PhD degree program is composed of a common core and pathways of specialization. The core is centered around three areas: design research, which provides a methodology for understanding the ways design and media touch every aspect of daily life at every level of society; ethical practice, which engages with the humanistic concerns of design and cultural production; and experiential learning, which offers students the opportunity to produce research and conduct fieldwork with partner organizations.

Specialized pathways, customized according to the program of study as approved by the PhD advisors and vetted by external experts, include:

- Information design and visualization
- Design research
- Creative research

Degree Requirements

POSTBACCALAUREATE ENTRY

The PhD degree requires completion of at least 48 semester credit hours beyond a bachelor's degree. Students who enter with an undergraduate degree will typically need five years to complete the program.

ADVANCED ENTRY

Students can petition for an advanced entry, which requires completion of at least 28 semester hours. Advanced entry requires an advanced degree (MS, MA, MFA, etc.) or extensive experience aligned with the research direction of the candidate. While students can qualify for advanced entry upon acceptance, the decision for students to continue in the advanced program is made after the first year, where they have to demonstrate that they do not need additional coursework and can complete the program in four years.

Qualifying Examination

The qualifying exam is a written and/or oral examination in the primary and secondary research fields that ensures the student is intimately familiar with the relevant scholarly work in their area of concentration. The pedagogical role is not in the examination itself but in the rigorous preparation of the primary and secondary fields by the student, approved by the advisor. Prior to the qualifying exam, the student prepares a document that outlines the selected primary and secondary fields, provides an overview of the current state of research, and assembles a list of relevant literature that will serve as the basis for the examination. The emphasis of the examination (for example, short essays, a lecture presenting a scholarly argument) is to be useful for the dissertation research. Typically, the student takes the qualifying examination during the second year.

Dissertation Proposal Defense

To ensure students complete satisfactory dissertations that are appropriate for their focus area(s), all students are required to submit and defend a dissertation proposal prior to advancing to candidacy. The dissertation proposal is a detailed document outlining the scholarly context, methods, arguments, and activities underpinning the dissertation. It will include a detailed research plan and timeline and is to be approved by the student's dissertation committee, which the student has to assemble in advance. The student then defends the accepted dissertation proposal in the context of the research seminar, inviting feedback from faculty and other students. The dissertation proposal defense is open to the entire CAMD PhD community and constitutes the last step before degree candidacy.

Degree Candidacy

A student is considered a PhD degree candidate after:

- Successfully completing core and specialization courses with a minimum of a 3.000 cumulative GPA and no grades lower than a B in core courses
- Passing the qualifying exam
- Submitting and successfully defending the dissertation proposal

Advising and Committee Formation

Each entering student will be assigned to a faculty advisor based on their interests who will guide students in completing their core requirements of their degree. Ideally, this person will also serve as their thesis committee chair, but they may transition to another committee chair as they transition into ABD status. As part of this process, in addition to their thesis committee chair, they will also be expected to identify two other readers representing their secondary and, if applicable, tertiary discipline areas. The advisory committee will be responsible for guiding the students through their individual research proposal process, helping them to develop a robust research methodology and clear plan for completion. The advisory committee will also be responsible for identifying an appropriate external expert to consult at key stages of degree progression. The advisors will also guide the students through the thesis project and its written component. Where applicable, committee members will also mentor and support the student through funded research.

Dissertation Defense

Each student will, with the aid of their advisor and committee, define the final product. The research component will typically consist of empirical and/or theoretical scholarship created using a methodology appropriate for the topic and field that is fully integrated with the practice component. The synergy between creative practice and research can take the form of knowledge production through a variety of potential means: production of digital and physical artifacts, software and hardware applications, games, paintings, documentaries, comics, exhibitions, design projects or products, theatrical productions, musical compositions, performances, or other formats. The work will include a written dissertation that can also be paired with other modes of conveyance, such as a documentary, demonstration, performance, or exhibition. A key function of the dissertation will be to contextualize the practical work in contemporary scholarship and discourse, clearly articulating its rationale and contribution to the field. Over the course of their studies, students are expected to produce peer-reviewed submissions based on their work.

The dissertation defense follows a similar format to the proposal defense. Acceptable dissertation models may include long-form (book-style) dissertations, multiple publishable papers, a system build-evaluate model, or other creative formats enumerated above.

Program Requirements

Milestones

Annual review
Individual path (including advisors)
Teaching requirement
Qualifying examination
Dissertation proposal
Dissertation committee
Dissertation defense

Required Coursework

Code	Title	Hours
INAM 7000	Introduction to Research in Interdisciplinary Design and Media	4
INAM 7001	Research Methods in Interdisciplinary Design and Media	4
INAM 7900	Research Seminar	4
INAM 7901	Dissertation Writing Seminar	4

Research Methods Elective

Complete one research methods elective from this list or in consultation with your advisor. 4

ARCH 6340	Graduate Topics in Architecture
ARTG 5110	Information Design History
ARTG 5120	Research Methods for Design
ARTG 5310	Visual Cognition
ARTG 5320	Statistics for Design
ARTG 5620	Notational Systems for Experience
ARTG 6110	Information Design Theory and Critical Thinking
GSND 5110	Game Design and Analysis
GSND 5130	Mixed Research Methods for Games
GSND 6320	Psychology of Play
GSND 6340	Biometrics of Design
GSND 6350	Data-Driven Game Design
GSND 6984	Research
INAM 6300	Models for Applied Inquiry in Creative Practice
JRNL 5400	Media and Advocacy in Theory and Practice

Dissertation

INAM 9990	Dissertation Term 1
INAM 9991	Dissertation Term 2

Discipline-Specific Coursework

Code	Title	Hours
Complete 28 semester hours of discipline-specific coursework in consultation with your domain-specific advisor and committee members.		28

Program Credit/GPA Requirements

A minimum of 48 semester hours of coursework beyond the undergraduate degree is required.

A minimum 3.000 cumulative GPA and no grades lower than a B in core courses are required.

Plan of Study

Year 1			
Fall	Hours	Spring	Hours
INAM 7000		4 INAM 7900	4
INAM 7001		4 Research methods elective	4
Discipline-specific coursework		4 Discipline-specific coursework	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
Discipline-specific coursework		4 Discipline-specific coursework	4

Discipline-specific coursework		4	Discipline-specific coursework	4
Discipline-specific coursework		4	INAM 7901	4
		12		12
Year 3				
Fall	Hours		Spring	Hours
Qualifying exams		0	Teaching requirement, TA	0
Teaching requirement, TA		0	INAM 9991	
INAM 9990				
		0		0
Year 4				
Fall	Hours		Spring	Hours
Teaching requirement, teacher of record		0	Teaching requirement, teacher of record	0
INAM 9996		0	INAM 9996	0
		0		0
Year 5				
Fall	Hours		Spring	Hours
INAM 9996		0	INAM 9996	0
		0		0

Total Hours: 48

Advanced Entry Program Requirements
Milestones

- Annual review
- Individual path (including advisors)
- Teaching requirement
- Qualifying examination
- Dissertation proposal
- Dissertation committee
- Dissertation defense

Required Coursework

Code	Title	Hours
INAM 7000	Introduction to Research in Interdisciplinary Design and Media	4
INAM 7001	Research Methods in Interdisciplinary Design and Media	4
INAM 7900	Research Seminar	4
INAM 7901	Dissertation Writing Seminar	4
Research Methods Elective		
Complete one research methods elective from this list or in consultation with your advisor.		4
ARCH 6340	Graduate Topics in Architecture	
ARTG 5110	Information Design History	
ARTG 5120	Research Methods for Design	
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics for Design	
ARTG 5620	Notational Systems for Experience	
ARTG 6110	Information Design Theory and Critical Thinking	
GSND 5110	Game Design and Analysis	
GSND 5130	Mixed Research Methods for Games	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	
GSND 6984	Research	
INAM 6300	Models for Applied Inquiry in Creative Practice	
JRNL 5400	Media and Advocacy in Theory and Practice	
Dissertation		

INAM 9990

Dissertation Term 1

INAM 9991

Dissertation Term 2

Discipline-Specific Coursework

Code	Title	Hours
Complete 8 semester hours of discipline-specific coursework in consultation with your domain-specific advisor and committee members.		8

Program Credit/GPA Requirement

A minimum of 28 semester hours of coursework beyond the graduate degree is required.

A minimum 3.000 cumulative GPA and no grades lower than a B in core courses are required.

Advanced Entry Plan of Study

Year 1			
Fall	Hours	Spring	Hours
INAM 7000		4 INAM 7900	4
INAM 7001		4 Research methods elective	4
Discipline-specific coursework		4 Discipline-specific coursework	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
Qualifying exams		0 Teaching requirement, TA	0
Teaching requirement, TA		0 INAM 7901	4
INAM 9990		0 INAM 9991	0
		0	4
Year 3			
Fall	Hours	Spring	Hours
Teaching requirement, teacher of record		0 Teaching requirement, teacher of record	0
INAM 9996		0 INAM 9996	0
		0	0
Year 4			
Fall	Hours	Spring	Hours
INAM 9996		0 INAM 9996	0
		0	0
Total Hours: 28			

Network Science, PhD (Boston)

The PhD in Network Science program aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is a multidisciplinary program, with members of the Northeastern University Network Science Institute (<https://www.networkscienceinstitute.org/>) representing a range of fields including computer science, information science, physics, complexity, sociology, communication, data visualization, organizational behavior, political science, population health, and epidemiology.

This doctoral program is a joint collaboration across five academic colleges. Students are admitted to the College of Social Sciences and Humanities and may choose to move to the home college of their dissertation advisor after they reach candidacy (once they pass their dissertation proposal/comprehensive exam). Students follow policies of their home college, including dissertation format and submission deadlines for graduation. Faculty supervisors may be from one of the following Northeastern academic colleges:

- College of Science
- College of Social Sciences and Humanities
- Khoury College of Computer Sciences
- Bouvé College of Health Sciences
- College of Arts, Media and Design

Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of elective courses relevant to the student's area of research. Electives should be discussed with the student's faculty advisor. A minimum of 40 semester hours of coursework is required, though the faculty advisor or program committee may recommend additional coursework based on student research skills.

Alternative Course Path

Students have the option to complete core coursework in their first year of study. This curriculum pathway is expected to be taken by students whose admitting advisor is located outside of the Boston campus and elsewhere in the Northeastern network.

Annual Review

A review of satisfactory progress will be ongoing and formally evaluated at the end of each academic year. Students must maintain a cumulative grade-point average of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain a 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for dismissal by the graduate program committee.

As part of the annual review process, the students will be asked to submit a summary of completed and future courses and research. Students will submit to the program committee:

- A list of courses completed in the last academic year and course plan for the following year
- A short synopsis of their research progress and research plans for the next year

Qualifying Examination

The qualifying exam is an hour-long oral examination of the material covered in the core curriculum and consists of questions selected by network science faculty. One month prior to the exam., students receive between 50 to 80 study questions to prepare. Students will be asked to give a short presentation of their research plans, followed by an oral exam where the qualifying exam panel will ask a subset of the review questions.

Students must take the exam by the fall semester of their third year. If students fail the qualifying exam on their first attempt, they may retake the exam in the following semester. Students who do not pass the exam after two attempts will be asked to leave the program.¹

Dissertation Committee

Students must confirm their dissertation advisor by the end of their second year. The dissertation advisor must be a full-time, tenured, tenure-track, research, or teaching faculty member of Northeastern. The advisor should be a network science doctoral program faculty member, unless the student receives approval by the network science program committee.

Students must confirm their dissertation committee prior to their comprehensive exam. The committee must consist of a minimum of four members:

1. A dissertation advisor
2. A core member of the Network Science Institute faculty
3. An additional tenured/tenure-track, research, or teaching faculty member from the Network Science Institute or other Northeastern faculty approved by the advisor and program committee
4. One member recognized as an expert in the specific topic of research, who can be external to Northeastern.

Dissertation Proposal (Comprehensive Examination)

The comprehensive exam should be completed in the student's fourth year of study. The exam consists of two parts: preparation of the dissertation proposal and oral presentation of the proposal. Students must prepare a written comprehensive research proposal describing the dissertation research plan including review of relevant literature, research questions, motivation, methods, any preliminary results, and potential impact. The proposal must be shared with the doctoral committee members two weeks prior to the scheduled presentation.

Students will give a 30-minute oral presentation to their committee members that is open to the public. Following the presentation, the dissertation committee will assess the proposed research plan and provide feedback to the student. If the proposal and/or presentation do not meet the expectations of the committee, the student will be asked to revise their proposal and/or their presentation. The completion of the comprehensive exam is considered successful if the dissertation committee approves as satisfactory both the written proposal and the oral presentation. Students may repeat the comprehensive exam once. If they are unsuccessful in their second attempt, the program will ask the student to leave the program.

PhD Candidacy

A student is considered a doctoral candidate upon completion of the required coursework with a minimum cumulative GPA of 3.000, a passing score on the qualification exam, and satisfactory completion of the comprehensive exam.

Dissertation

A PhD student should aim to complete their dissertation in their fifth year of study. Upon successful completion of the research plan proposed in the dissertation proposal, the candidate has an opportunity to prepare the dissertation for approval by the dissertation committee. The dissertation must contain results of extensive research and make an original contribution to the field. The work should give evidence of the candidate's ability to carry out independent research. It is expected that the dissertation consists of one or more research studies of sufficient quality to merit publication in a reputable journal(s).

Dissertation Defense

Like the dissertation proposal, the dissertation defense consists of two parts: the written dissertation and the defense oral presentation. The PhD candidate should send the written dissertation to their dissertation committee at least one month prior to the dissertation defense.

The oral dissertation defense will be open to the public and will include a Q&A session. Following the presentation, the dissertation committee will communicate their assessment of whether they consider the candidate's dissertation requirement fulfilled. Once the dissertation requirement is fulfilled, the PhD candidate is ready to graduate. Students then apply to graduate and follow the formatting guidelines and deadlines of their home college.

¹Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MS in Network Science degree. Note that no students will be admitted directly into the MS in Network Science to pursue a master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Coursework
Annual reviews
Qualifying exam
Dissertation committee
Dissertation proposal (comprehensive examination)
Dissertation
Dissertation defense

Core Requirements

Code	Title	Hours
Students must complete all 20 semester hours of the core courses listed below, unless the program director approves changes to the student's course plan:		
NETS 5116	Network Science 1	4
NETS 6116	Network Science 2	4
NETS 7332	Machine Learning with Graphs	4
NETS 7334	Social Networks	4
NETS 7335	Dynamical Processes in Complex Networks	4

Electives

Code	Title	Hours
Complete 20 semester hours from the following elective course options.		20
The student's elective course plan should be discussed with, and approved by, their advisor. Students who seek to apply courses not on this list to fulfill program requirements must obtain written approval from their advisor and the program director. Elective options below are organized by domain areas. Students may take courses from one or more domain areas.		

Computational Social Science

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5314	Complexity in Social Systems
CNET 5411	Financial and Economic Networks
CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
NETS 7341	Network Economics
NETS 7350	Bayesian and Network Statistics
NETS 7360	Research Design for Social Networks
NETS 7370	Computational Urban Science
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHYS 7332	Network Science Data 2

Computer Science

CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data

CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6220	Data Mining Techniques
CS 7180	Special Topics in Artificial Intelligence
CS 7260	Visualization for Network Science
CS 7295	Special Topics in Data Visualization
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHYS 7332	Network Science Data 2

Epidemiology and Public Health

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5515	Complex Network Analysis for Biological Systems
CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
NETS 7370	Computational Urban Science
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6202	Intermediate Epidemiology
PHTH 6400	Principles of Population Health 1
PHTH 6410	Principles of Population Health 2
PHTH 6800	Causal Inference in Public Health Research
PHYS 7332	Network Science Data 2

Mathematic and Physics

CNET 5901	Visualizing Complex Networks
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CS 5800	Algorithms
MATH 7233	Graph Theory
MATH 7243	Machine Learning and Statistical Learning Theory 1
NETS 7976	Directed Study
NETS 8941	Network Science Literature Review Seminar
PHYS 5211	Introduction to Scientific Computing
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
PHYS 7332	Network Science Data 2

Dissertation

Code	Title	Hours

Precandidacy

Students should register for NETS 8986 after passing the qualifying exam and before completing the comprehensive exam (proposal defense):

NETS 8986	Research

Dissertation

After passing the comprehensive exam (reaching candidacy), students should register for NETS 9990 and NETS 9991, successively:

NETS 9990	Dissertation Term 1
NETS 9991	Dissertation Term 2

Dissertation Continuation

After completing both NETS 9990 and NETS 9991, students should register for NETS 9996 each semester until graduation:

NETS 9996

Dissertation Continuation

Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Typical Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
Elective course		4 NETS 7334	4
Elective course		4 One elective course	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
NETS 7332		4 NETS 7335	4
One elective course		4 One elective course	4
		8	8
Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0

Total Hours: 40

Alternate Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
NETS 7332		4 NETS 7334	4
One elective course		4 NETS 7335	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
Elective		4 Elective	4
Elective		4 Elective	4
		8	8
Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0

Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0
Total Hours: 40			

Arts Administration and Cultural Entrepreneurship, MS (Boston)

The arts and cultural industries are key drivers of each nation's economy, contributing more than \$730 billion annually in the United States alone. While the economic impact of the arts and cultural industries can be measured, their social impacts are often underestimated. Music, dance, visual art, and theatre are critical to how we perceive, interpret, and critique the world and people around us. The arts articulate our beliefs, politics, familial and community ties, and history.

Arts administrators are the bridge between creative practitioners and audiences and between arts institutions and supportive stakeholders. In today's digitally driven, highly competitive, and increasingly global economy, traditional institutions for visual and performing arts face critical sustainability challenges. Leaders in the arts must adopt the creative thinking and problem-solving skills of an entrepreneur in order to envision new models for creative practice, audience engagement, and funding.

The interdisciplinary Master of Science in Arts Administration and Cultural Entrepreneurship (AACE) prepares arts leaders to both convey the human necessity of creative expression and apply creative thinking to manage resources, inspire audience engagement, and sustain financial support. The arts, and audience opportunities to experience them, are more dynamic and diverse than ever before, flourishing in major arts institutions as well as nonhierarchical organizations, from artist-run spaces and community organizations to annual festivals and pop-up exhibitions. It is time for a transformation in leadership training that matches the ingenuity of today's most exciting experiments in music, dance, theatre, and the visual arts. Arts leaders must also be equipped with the administrative, analytical, and technological skill sets necessary to excel within the complex, interdependent arts ecosystem.

The AACE curriculum is designed to meet the changing needs of arts leaders, from administrators in arts institutions to creative practitioners and entrepreneurs eager to make their art startup a reality. The program focuses on leadership innovation in a range of performance, visual arts, and cultural organizations. As an intellectual and practical course of study that merges the expertise of academics, creative professionals, administrators, and entrepreneurs, the program's aim is to support sustainable creative practice.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Arts Administration Foundation		
AACE 6000	Arts and Culture Organizational Leadership	3
AACE 6010	Planning for Arts and Cultural Organizations	3
AACE 6020	Experiential Study in Arts Administration	3
Cultural Entrepreneurship Foundation		
AACE 6200	Programming and Community Engagement for Cultural Entrepreneurs	3
AACE 6210	Building Value Through Cultural Enterprise	3
AACE 6300	Fundraising in the Arts	3

Electives

Code	Title	Hours
Arts Administration Directed Elective		
Complete one of the following:		3
AACE 6110	Information Technology for Arts and Cultural Organizations	
AACE 6120	Advocacy and the Arts	
Cultural Entrepreneurship Directed Elective		
Complete one of the following:		3
AACE 6220	Innovative Approaches to Audience Engagement	

ENTR 6210	Managing Operations in Early Stage Ventures
ENTR 6212	Business Planning for New Ventures
ENTR 6214	Social Enterprise
ENTR 6216	Global Social Entrepreneurship and Innovation
ENTR 6218	Business Model Design and Innovation
ENTR 6240	Emerging and Disruptive Technologies
ENTR 6250	Lean Design and Development

Experiential Electives in Arts Leadership

Complete two of the following courses not taken to fulfill the above requirements:

6

AACE 6110	Information Technology for Arts and Cultural Organizations
AACE 6120	Advocacy and the Arts
AACE 6220	Innovative Approaches to Audience Engagement
ARTG 6310	Design for Behavior and Experience
LW 6110	Law of Information and Records
LW 6120	Law and Strategy
LW 6160	Regulation and Global Business Strategies

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Plan of Study**Sample Plans of Study****TWO YEARS****Year 1**

Fall	Hours	Spring	Hours	Summer 1	Hours	
AACE 6000		3 AACE 6010		3 Arts Administration Directed Elective		3
AACE 6200		3 AACE 6300		3		
		6		6		3

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	
AACE 6020		3 Cultural Entrepreneurship Directed Elective		3 Experiential Elective 2		3
AACE 6210		3 Experiential Elective 1		3		
		6		6		3

Total Hours: 30**ONE AND A HALF YEARS****Year 1**

Fall	Hours	Spring	Hours	Summer 1	Hours	
AACE 6000		3 AACE 6010		3 Arts Administration Directed Elective		3
AACE 6200		3 AACE 6020		3		
AACE 6210		3 AACE 6300		3		
		9		9		3

Year 2

Fall	Hours	
Cultural entrepreneurship directed elective		3
Experiential elective 1		3
Experiential elective 2		3
		9

Total Hours: 30

Creative Collaboration and Multidisciplinary Design, MS (Boston)

Overview

The Master of Science in Creative Collaboration and Multidisciplinary Design is an executive education degree rooted in the creative process as the main driver for adaptive thinking, dynamic communication, and empowering collaboration. In today’s highly networked organizational structures, current and future leaders will need the skills to navigate the creative process, respond to shifting landscapes with agility, and articulate their vision through multiple modalities in ways that inspire, connect, and call others to action. This highly interactive, experiential degree will provide students with a combination of design skills and creativity techniques in a project-based learning environment to foster innovative leadership and empower communication. Graduates will leave with a flexible toolkit to nurture their individual creativity, adaptability in the face of rapid change, and skills to become well-rounded strategists and communicators.

Program Requirements

Program Requirements

Code	Title	Hours
Foundation		
INAM 5300	Principles of Design	2
INAM 5305	User Observation and Design Planning	2
INAM 5310	Principles of Creative Collaboration	2
Seminars		
INAM 5507	Foundations of Data Visualization	1
INAM 5508	Visual Data Encodings	1
Experiential		
INAM 5400	Facilitating Creative Collaboration	2
INAM 5405	The Agile Mindset and Design-Led Innovation	2
INAM 5410	Persuasion and the Power of Storytelling	2
Studio		
INAM 5415	Design Studio: Fundamentals of Iterative Prototyping	2
Capstone		
INAM 6900	Interdisciplinary Capstone	4

Electives

Code	Title	Hours
Complete 12 semester hours of electives from one of the ranges below (or in consultation with your graduate advisor):		12
INAM 5300 to INAM 5349		
INAM 5400 to INAM 5449		
INAM 5500 to INAM 5549		
INAM 6500 to INAM 6549		

Plan of Study

Sample Full-Time Plan of Study

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
INAM 5300		2 INAM 5400		2 INAM 5415	2
INAM 5305		2 INAM 5405		2 INAM 5507	1
INAM 5310		2 INAM 5410		2 INAM 5508	1
Electives		6 Electives		6 INAM 6900	4
12			12		8

Total Hours: 32

Sample Part-Time Plan of Study

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
INAM 5300		2 INAM 5400		2 INAM 5415	2
INAM 5305		2 INAM 5405		2 INAM 5507	1
INAM 5310		2 INAM 5410		2 INAM 5508	1

Elective	2 Elective	2 Elective	4
	8	8	8
Year 2			
Fall	Hours		
Electives	4		
INAM 6900	4		
	8		
Total Hours: 32			

Extended Realities, MS (Boston)

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality.

This program is structured to allow students flexibility and specialization to choose a path that matches their interest. Students have an opportunity to focus on a concentration area that matches their professional background and aspirations.

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their home college. The concentrations are associated with the following colleges:

- Khoury College of Computer Sciences
 - Artificial Intelligence
 - Human Computer Interaction
- D'Amore-McKim School of Business
 - Entrepreneurship
 - Marketing
- Bouvé College of Health Sciences
 - Human Movement Science
- College of Social Sciences and Humanities
 - Information Ethics
 - Public History
- College of Engineering
 - Wireless Networking
- College of Arts, Media and Design
 - XR and Design
 - XR and Games
 - XR and Media

The Master of Science in Extended Realities welcomes students from a diverse range of backgrounds because of the applications of XR technology used in many disciplines and industries including medicine, business, entertainment, architecture, and journalism.

Some concentrations may require a technical background and are noted in the requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Extended Reality Core

Code	Title	Hours
Required Courses		
EXRE 5010 and EXRE 5011	Immersive Media: Extended Realities (XR) History, Theory, and Impact and Seminar for EXRE 5010	5
EXRE 5020	Developing Extended Realities (XR)	4
EXRE 5030	Designing Extended Realities (XR)	4
EXRE 7500 or EXRE 7990	Extended Realities (XR) Project Thesis	4
GSND 5122	Business Models in the Game Industry	1

Extended Reality Concentration Options

Complete one of the following options:

- Artificial Intelligence (p. 176)—Khoury College of Computer Sciences
- Entrepreneurship (p. 176)—D'Amore-McKim School of Business
- Human Computer Interaction (p. 176)—Khoury College of Computer Sciences
- Human Movement Science (p. 176)—Bouv  College of Health Sciences
- Information Ethics (p. 177)—College of Social Sciences and Humanities
- Marketing (p. 177)—D'Amore-McKim School of Business
- Public History (p. 177)—College of Social Sciences and Humanities
- Wireless Networking (p. 178)—College of Engineering
- XR and Design (p. 178)—College of Arts, Media and Design
- XR and Games (p. 178)—College of Arts, Media and Design
- XR and Media (p. 178)—College of Arts, Media and Design

Program Credit/GPA Requirements

34 total semester hours required. Some concentrations may require more than 34 semester hours to complete.

Minimum 3.000 GPA required

CONCENTRATION IN ARTIFICIAL INTELLIGENCE—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Requires a background in computer science.		
CS 5097	Mixed Reality	4
CS 5100	Foundations of Artificial Intelligence	4
CS 6120	Natural Language Processing	4
CS 6140	Machine Learning	4
or DS 5220	Supervised Machine Learning and Learning Theory	

CONCENTRATION IN ENTREPRENEURSHIP—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
INNO 6200	Enterprise Growth and Innovation	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
GE 5030	Iterative Product Prototyping for Engineers	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

CONCENTRATION IN HUMAN COMPUTER INTERACTION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Required Courses		
CS 5340	Computer/Human Interaction	4
Electives		
Complete 12 semester hours from the following:		12
ARTG 5710	Design for Dignity	
CS 5097	Mixed Reality	

CS 5170	Artificial Intelligence for Human-Computer Interaction
CS 6350	Empirical Research Methods
CS 7390	Special Topics in Human-Centered Computing
GSND 6340	Biometrics of Design

CONCENTRATION IN HUMAN MOVEMENT SCIENCE—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
Required Courses		
GSND 6340	Biometrics of Design	4
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
Electives		
Complete 7–8 semester hours from the following:		7-8
PT 5133	Kinesiology	
PT 5150	Motor Control, Development, and Learning	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 5410	Functional Human Neuroanatomy	
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	
PT 7020	Technologies in Movement and Rehabilitation Science	

CONCENTRATION IN INFORMATION ETHICS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
Electives		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MARKETING—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

CONCENTRATION IN PUBLIC HISTORY—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
HIST 5237	Issues and Methods in Public History	4
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1 (to be taken twice)	
Electives		
Complete 8 semester hours from the following:		8
HIST 5241	Exhibits and Museums	
HIST 7250	Topics in Public History (Public History and Slavery)	
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)	

CONCENTRATION IN WIRELESS NETWORKING—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
EECE 5512	Networked XR Systems	
EECE 7374	Fundamentals of Computer Networks	
Electives		
Complete 8 semester hours from the following:		8
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	

CONCENTRATION IN XR AND DESIGN—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5640	Prototyping for Experience Design	4
EXRE 6500	Extended Realities (XR) Studio	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN XR AND GAMES—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
Electives		
Complete 8 semester hours from the following:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6001	Advanced Topics in Game Science	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6330	Player Experience	
GSND 6340	Biometrics of Design	

GSND 6350	Data-Driven Game Design
GSND 6460	Generative Game Design

CONCENTRATION IN XR AND MEDIA—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics	
JRNL 6341	Telling Your Story with Data	

Plan of Study

Sample Plan of Study

The following is a sample plan of study for a student in the Concentration in XR and Games.

Year 1			
Fall	Hours	Spring	Hours
EXRE 5010 and EXRE 5011		5 EXRE 5030	4
EXRE 5020		4 GSND 5110 and GSND 5111	5
		9	9
Year 2			
Fall	Hours	Spring	Hours
EXRE 6500		4 EXRE 7500	4
GSND 5122		1 XR and games elective 2	4
XR and games elective 1		4	
		9	8
Total Hours: 35			

Extended Realities, MS (Oakland)

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities (XR) to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality.

In this degree program, students are admitted to the College of Arts, Media and Design and their degree is awarded by that college. Students will follow all policies associated with the College of Arts, Media and Design.

The Master of Science in Extended Realities welcomes students from a diverse range of backgrounds because of the applications of XR technology used in many disciplines and industries, including medicine, business, entertainment, architecture, and journalism.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Extended Realities Core

Code	Title	Hours
Required Courses		
EXRE 5010 and EXRE 5011	Immersive Media: Extended Realities (XR) History, Theory, and Impact and Seminar for EXRE 5010	5
EXRE 5020	Developing Extended Realities (XR)	4
EXRE 5030	Designing Extended Realities (XR)	4

EXRE 7500 or EXRE 7990	Extended Realities (XR) Project Thesis	4
GSND 5122	Business Models in the Game Industry	1

Concentration in XR and Games—College of Arts, Media and Design

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
Electives		
Complete 8 semester hours from the following:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6001	Advanced Topics in Game Science	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6330	Player Experience	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	
GSND 6460	Generative Game Design	

Program Credit/GPA Requirements

35 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Sample Plan of Study

CONCENTRATION IN XR AND GAMES—COLLEGE OF ARTS, MEDIA AND DESIGN

Year 1			
Fall	Hours	Spring	Hours
EXRE 5010 and EXRE 5011		5 EXRE 5030	4
EXRE 5020		4 GSND 5110 and GSND 5111	5
		9	9
Year 2			
Fall	Hours	Spring	Hours
EXRE 6500		4 EXRE 7500	4
GSND 5122		1 XR and Games Elective 2	4
XR and Games Elective 1		4	
		9	8

Total Hours: 35

Urban Planning and Policy, MS (Boston)

The Master of Science in Urban Planning and Policy program trains leaders interested in building just and sustainable solutions to today's critical urban problems. Students in the program develop the theoretical and analytical tools to understand contemporary challenges of social, racial, and environmental injustice in cities and urban regions. They develop professional tools to work effectively in the realms of planning, policy, politics, and advocacy to impact urban challenges, including affordable housing provision, equitable and sustainable economic growth, sustainable transportation, and climate change adaptation and mitigation. This innovative program combines the expertise in urban planning and policy analysis data analytics of the School of Public Policy and Urban Affairs with expertise in physical planning, design, and data visualization at the School of Architecture. The core curriculum of the program provides students with a solid foundation in essential skills and concepts, including techniques of effective community engagement, research design and statistics, economic analysis, legal foundations of urban planning and policy, and the history of urban development and urban planning. Students also have the opportunity to develop substantial expertise in a specialization area, including urban analytics, urban sustainability and resilience, urban design and physical planning, and urban development policy and planning.

The optional cooperative education experience (co-op) is available to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

In addition to the co-op option, students in the program have opportunities to gain experience in the application of their knowledge and skills via internships, class projects, and a capstone research report. They graduate prepared for careers working for state and local government, federal agencies, community development corporations and other nonprofit organizations, research institutes, and as private-sector planning consultants.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Planning and Policy		
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
PPUA 6502	Economic Analysis for Policy and Planning	4
SUEN 6340	Topics in Urban Environmental Design	4
Research Design		
INSH 6300	Research Methods in the Social Sciences	4
Quantitative Techniques		
Students in the urban analytics focus area are encouraged to take INSH 5301.		
Choose one from the following:		4
INSH 5301	Introduction to Computational Statistics	
INSH 6500	Statistical Analysis	
Planning Law		
Choose one from the following:		2-4
LPSC 5201	Law and the City	
PPUA 5201	Urban Planning and the Law	
Planning and Social Justice		
Choose one from the following:		2-4
PPUA 5233	Contemporary Community Development	
PPUA 5235	Participatory Community Planning Methods	
PPUA 6219	Race, Justice, and Belonging in Planning Practice	

Focus Areas

Complete one of the following focus areas:

- Urban Design and Physical Planning (p. 255)
- Urban Analytics (p. 256)
- Sustainability and Resilience (p. 256)
- Urban Development Policy and Planning (p. 256)

URBAN DESIGN AND PHYSICAL PLANNING

Code	Title	Hours
Gateway Course		
ARCH 6340	Graduate Topics in Architecture	4
Tracks		
Complete one of the following tracks:		8
<i>Urban Design and Real Estate</i>		
ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
<i>Physical Planning and Design for Sustainable Urbanism</i>		
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
<i>Urban Experience Track</i>		

ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
ARTG 6310	Design for Behavior and Experience	

Capstone

SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	6

URBAN ANALYTICS

Code	Title	Hours

Gateway Course

PPUA 5262	Big Data for Cities	4

Required Courses

ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4

Capstone

PPUA 7673	Capstone in Public Policy and Urban Affairs	4

SUSTAINABILITY AND RESILIENCE

Code	Title	Hours

Gateway Course

LPSC 7312	Cities, Sustainability, and Climate Change	4
or SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	

Methods

Complete one of the following:		4

PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
SUEN 7230	Urban Ecologies and Technologies 1	

Capstone

PPUA 7673	Capstone in Public Policy and Urban Affairs	4

Elective

Complete one of the following:		4

PPUA 5231	Transportation Policy	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 6340	Topics in Urban Environmental Design	
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	

URBAN DEVELOPMENT POLICY AND PLANNING

Code	Title	Hours

Gateway Course

Complete one of the following:		4

PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5233	Contemporary Community Development	
PPUA 5265	Global Urbanization and Planning	

Methods

PPUA 5263 or PPUA 5236	Geographic Information Systems for Urban and Regional Policy Introduction to Real Estate Development for Urban Policy Makers	4
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
Elective		
Complete one of the following:		4
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers	
PPUA 5265	Global Urbanization and Planning	
PPUA 5270	Food Systems and Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6551	Nonprofit Organizations and Social Change	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6340	Topics in Urban Environmental Design	

Electives

Code	Title	Hours
Complete 4-8 semester hours of the following:		4-8
ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
ARCH 6100	Graduate Skills Studio	
ARCH 6330	Seminar in Modern Architecture	
ARCH 6340	Graduate Topics in Architecture	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
ARTG 5130	Visual Communication for Information Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6330	Information Design Mapping Strategies	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5302	Information Design and Visual Analytics	
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5244	Comparative Public Policy and Administration	
PPUA 5245	Education Policy in the United States	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5265	Global Urbanization and Planning	
PPUA 5270	Food Systems and Public Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	

PPUA 6506	Techniques of Policy Analysis
PPUA 6551	Nonprofit Organizations and Social Change
PPUA 7237	Advanced Spatial Analysis of Urban Systems
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems
SUEN 6210	Implementation and Visualization for Urban Environments 1
SUEN 6220	Implementation and Visualization for Urban Environments 2
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory
SUEN 6340	Topics in Urban Environmental Design
SUEN 7230	Urban Ecologies and Technologies 1
SUEN 7240	Urban Ecologies and Technologies 2
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration:		2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

48 total semester hours required (50 with optional co-op)

Minimum 3.000 GPA required

AI Applications, Graduate Certificate (Boston)

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- College of Social Sciences and Humanities
- D'Amore-McKim School of Business
- Mills College at Northeastern

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

Experiential Courses

Code	Title	Hours
Complete 4 semester hours from the following:		4
CRIM 6600	Justice, Technology, and AI	

EDUT 6150	AI in Education
HLTH 5800	AI Across the Health Sciences
IE 5640	Data Mining for Engineering Applications
JRNL 6460	AI in Media Industries
MISM 6250	Strategic AI for Business

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Arts Administration, Graduate Certificate (Boston)

Today's arts sector is more vital and dynamic than ever, flourishing in both arts institutions and "non-hierarchical organizations," from artist-run spaces to community organizations. This context, paired with changes in the funding climate over the past 30 years, has generated a need to transform leadership training in the arts. Creative thinkers must be equipped with administrative, analytical, entrepreneurial, and technological skill sets to work within the complex, interdependent arts and cultural ecosystem.

The **Graduate Certificate in Arts Administration** offers an interdisciplinary graduate program focused on leadership innovation in performance, visual arts, cultural, and community organizations.

The Graduate Certificate in Arts Administration challenges students to create diverse, viable, and sustainable arts and culture projects and organizations; to use entrepreneurial practices in order to create transformation; to develop and deploy new arts and culture sector-focused business and analytic skills; and to design innovative planning and engagement strategies. Course and project work embeds experiential opportunities to explore and demonstrate transformational arts management approaches.

The required curriculum includes three core and one directed elective for a total of 12 credit hours. All courses can be completed online.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
AACE 6000	Arts and Culture Organizational Leadership	3
AACE 6010	Planning for Arts and Cultural Organizations	3
AACE 6020	Experiential Study in Arts Administration	3

Elective

Code	Title	Hours
Complete one of the following:		3
AACE 6110	Information Technology for Arts and Cultural Organizations	
AACE 6200	Programming and Community Engagement for Cultural Entrepreneurs	
AACE 6210	Building Value Through Cultural Enterprise (Building Value through Cultural Enterprise)	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Cultural Entrepreneurship, Graduate Certificate (Boston)

Cultural entrepreneurs combine their passion for creative and cultural products and programs with creative, out-of-the-box thinking to forge the resilience of the arts sectors and the wider communities they serve. Cultural entrepreneurs employ innovative approaches to audience engagement – like a roving theater company, pop-up museum, or a smartphone app for artistic collaboration – to deliver artistic value to wide and diverse audiences and make a positive social, environmental, and economic impact. Today's cultural entrepreneurs operate in diverse professional environments, from consulting for organizational transformation to launching a creative startup. By understanding community impacts and activating a range of cultural and creative experiences, cultural entrepreneurs play a crucial role in ensuring the vitality of artistic engagement, advancing community goals, and strengthening society.

The **Graduate Certificate in Cultural Entrepreneurship** empowers students with a critical, creative perspective on arts programming and management and a myriad of creative management tools that harness new technologies for artistic engagement.

The Graduate Certificate in Cultural Entrepreneurship offers an interdisciplinary program to create diverse and viable projects and organizations for artistic experience and positive social impact. The program prepares students to become innovators in a range of artistic and cultural disciplines, from music, visual art, theater, and dance to community-building and transformation. The curriculum offers students the opportunity to identify opportunities for evolution in the arts and cultural sectors and to develop critical, creative practices; leadership acumen; and skill sets in arts management, strategic planning, and performance analysis to conceive and implement creative, cultural programming for community engagement and positive impact.

The program learning objectives provide students with opportunities to:

- Develop an understanding of methods and tools used to conceptualize, scope, pilot, evaluate, iterate and launch cultural entrepreneurship projects;
- Align creative practice and arts enterprise strategies with opportunities, challenges and resources to achieve desired impact;
- Apply communication, engagement and evaluation techniques to develop and sustain diverse audiences and stakeholder relationships;
- Engage in critical analysis of the work of peers and industry leaders by analyzing and contextualizing the quality, viability and sustainability of culturally-driven entrepreneurship.

The required curriculum includes three core courses and one directed elective for a total of 12 semester hours. All courses can be completed online.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
AACE 6200	Programming and Community Engagement for Cultural Entrepreneurs	3
AACE 6210	Building Value Through Cultural Enterprise	3
AACE 6220	Innovative Approaches to Audience Engagement	3

Elective

Code	Title	Hours
Complete one of the following:		3
AACE 6000	Arts and Culture Organizational Leadership	
AACE 6010	Planning for Arts and Cultural Organizations	
AACE 6110	Information Technology for Arts and Cultural Organizations	
ENTR 6212	Business Planning for New Ventures	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Product Management, Graduate Certificate (Boston)

The Graduate Certificate in Product Management is designed for students with undergraduate degrees in a wide range of fields—including computer science, engineering, economics, business administration, design, and psychology—who want to build the skills necessary for success as product managers. This certificate equips students with the expertise to excel in this dynamic field, whether they are early career professionals, transitioning into product roles, or looking to differentiate themselves in a competitive job market. The program provides a flexible, cost-effective alternative to a full MS program while offering hands-on learning experiences.

Curriculum and Structure

This interdisciplinary certificate offers a structured yet adaptable curriculum that balances foundational knowledge with practical, industry-relevant skills.

The program consists of four courses (12–13 semester hours total):

- Three core courses covering fundamental concepts across key product management functions
- One experiential course (1 credit) providing hands-on learning opportunities tailored to students’ backgrounds and career goals in product management

This certificate allows students to gain real-world experience, develop in-demand skills, and enhance their career opportunities within a streamlined, flexible structure.

Admissions and College Affiliation

Students are admitted to the certificate program through one of the following colleges and follow the academic policies of their home college:

- College of Arts, Media and Design
- College of Engineering
- D'Amore-McKim School of Business
- Office of the Provost and College of Professional Studies¹

This certificate provides a fast, flexible, and practical pathway for students looking to build expertise in product management while benefiting from Northeastern University's strong academic and professional support network.

¹ Program Structure and Transition

- For the 2025–2026 academic year, the Graduate Certificate in Product Management is being offered as a collaboration between the College of Professional Studies and the Office of the Provost. During this period, students will follow Northeastern's graduate academic calendar and be governed by the academic policies and procedures outlined in the university's *Graduate Catalog*.
- While designated under the Office of the Provost, students will receive full academic and student support services from the College of Professional Studies including academic advising, co-op and career advising, and access to the International Tutoring Center.
- Beginning in the 2026–2027 academic year, the certificate program will transition fully to the College of Professional Studies. At that time, students will be officially designated under CPS in the academic system of record and governed by its academic policies as outlined in the university's *Graduate Catalog*.

Program Requirements

Requirements

Code	Title	Hours
Fundamental Concepts		
ARTG 5600	Experience Design Studio 1: Principles	4
EMGT 6750 or PDM 6000	Advanced Product Management Foundations of Product Management	3-4
INNO 6409	Innovation Portfolio Management	4
Experiential Course		
Complete one of the following:		1
ARTG 5540	Design and Product Management	
EMGT 6760	Technical Product Management	
INNO 6411	Product Innovation Management	
PDM 6940	Product Analytics	

Program Credit/GPA Requirement

12 total semester hours required (additional hours may be required based on student choice of course options)

Minimum 3.000 GPA required

D'Amore-McKim School of Business

Website (https://damore-mckim.northeastern.edu/?utm_medium=website&utm_source=catalog)

David De Cremer, PhD, Dunton Family Dean

Kate E. Klepper, MBA, Associate Dean of Graduate Programs

Founded in 1922, the D'Amore-McKim School of Business exemplifies Northeastern University's experiential learning and entrepreneurial spirit. Our graduate programs are designed to prepare learners to be responsible business leaders of the world capable of working, navigating, and creating in a digital environment.

D'Amore-McKim is part of a thriving global network, attracting some of the best and brightest faculty across the business world. Many are founders of startups and respected management leaders, and our students benefit daily from their research and expertise.

Experience-powered learning is at the heart of everything we do. Our students do more than master skills in their chosen business field. They put the knowledge gained from a demanding curriculum to work as they apply what they've learned to authentic business challenges. This educational model sets us apart.

Graduate School of Business Administration

617.373.5992

Campus-based programs: gradbusiness@northeastern.edu

Online programs: online@northeastern.edu

Graduate School of Professional Accounting

617.373.3244

gspa@northeastern.edu

Master of Science

At Northeastern University's D'Amore-McKim School of Business, we prepare students to be responsible global business leaders who thrive in a digital world. Our master's degree programs (<https://damore-mckim.northeastern.edu/catalog-ms-programs/>) help students build specialized expertise and gain a competitive advantage.

In our innovative master's programs, students learn across borders and get ready to make a real impact. They benefit from our esteemed business faculty including consultants, startup founders, and respected management leaders. Plus, they study alongside classmates from varied industries who share their passions and interests.

Programs

Master of Science (MS)

- Business Analytics (Boston) (p. 263)
- Business Analytics (Oakland) (p. 264)
- Business Analytics—Online (p. 265)
- Extended Realities (Boston) (p. 175)
- International Management (Boston) (p. 270)
- Management (Boston) (p. 271)
- Management with Major in Fintech Management (Miami) (p. 281)

Master of Science in Accounting (MSA)

- Accounting (Boston) (p. 282)
- Accounting and Business Administration (Boston) (p. 283)

Master of Science in Finance (MSF)

- Finance (Boston) (p. 284)
- Quantitative Finance (Boston) (p. 285)
- Quantitative Finance (Oakland) (p. 286) **Admissions to this program have been suspended.**

Business Analytics, MS (Boston)

Northeastern University D'Amore-McKim School of Business's Master of Science in Business Analytics (https://damore-mckim.northeastern.edu/programs/ms-business-analytics/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=msba) prepares students to lead in a business world driven by Big Data.

Make Data-Driven Business Decisions

Students build the skills to know what data to analyze and understand how to leverage that data for strategic decision making. Classwork provides exposure to data mining, statistical and quantitative analysis, multivariate testing, and predictive modeling. Students explore how to build sales, enhance marketing, or strengthen a company's infrastructure.

Integrate Classroom and Professional Experiences

Through in-class case studies and a capstone project, professors share real company data so that students apply their knowledge to actual business challenges. They gain unique perspectives as they learn from renowned experts who have led through times of rapid change. Through an optional graduate co-op, students translate ideas into action as they complete a project for an organization.

Complete the Degree in as Few as 12 Months

Students complete seven courses throughout the first two semesters and an optional career management class developed by the Graduate Career Center advisor. Students may complete their final three courses over the summer term or can extend their studies and complete their program in the fall term.

Students enroll in this 30-semester-hour master's degree program for full-time study.

Program Requirements

Core Requirements

Code	Title	Hours
MISM 6200	Introduction to Business Analytics	3
MISM 6202	Foundations of Data Analysis for Business	3
MISM 6205	Data Wrangling for Business	3
MISM 6210	Information Visuals and Dashboards for Business	3

MISM 6212	Data Mining and Machine Learning for Business	3
MISM 6213	Business Information Design, Quality, and Strategy	3
MISM 6214	Business Analytics Capstone	3

Elective Coursework

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		9
HRMG 6223	Global Talent Management	
INTB 6230	Global Field Study	
MISM 6201	Database Management for Business	
MISM 6206	Modeling for Business	
SCHM 6201	Operations and Supply Chain Management	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	
MKTG electives as advised		

Optional Career Management Course

Code	Title	Hours
BUSN 6200	Career Management	

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Business Analytics, MS (Oakland)

Northeastern University D'Amore-McKim School of Business's Master of Science in Business Analytics (https://damore-mckim.northeastern.edu/programs/ms-business-analytics/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=msba) is designed to prepare students to lead in a business world driven by Big Data.

Make Data-Driven Business Decisions

Students build the skills to know what data to analyze and understand how to leverage that data for strategic decision making. Classwork provides exposure to data mining, statistical and quantitative analysis, multivariate testing, and predictive modeling. Students explore how to build sales, enhance marketing, or strengthen a company's infrastructure.

Integrate Classroom and Professional Experiences

Through in-class case studies and a capstone project, professors share real company data so that students apply their knowledge to actual business challenges. They gain unique perspectives as they learn from renowned experts who have led through times of rapid change. Through an optional graduate co-op, students translate ideas into action as they complete a project for an organization.

Complete the Degree in as Few as 12 Months

Students complete seven courses throughout the first two semesters and an optional career management class developed by the Graduate Career Center advisor. Students may complete their final three courses over the summer term or can extend their studies and complete their program in the fall term.

Students enroll in this 30-semester-hour master's degree program for full-time study.

Program Requirements

Core Requirements

Code	Title	Hours
MISM 6400	Introduction to Business Analytics	2
MISM 6402	Foundations of Data Analysis for Business	2
MISM 6405	Data Wrangling for Business	2
MISM 6410	Information Visuals and Dashboards for Business	4
MISM 6412	Data Mining and Machine Learning for Business	4
MISM 6413	Designing Information Products for Transforming Business	4
MISM 6414	Business Analytics Capstone	4

Elective Coursework

Code	Title	Hours
In consultation with advisor, complete 8 graduate-level semester hours for which prerequisites have been met:		8
FINA 6416	Valuation and Value Creation	
FINA 6417	Real Estate Investment	
HRMG 6423	Global Talent Management	
MISM 6401	Database Management for Business	
MISM 6406	Prescriptive Modeling for Business	
MKTG 6434	Marketing Analytics	

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Business Analytics, MS—Online

Northeastern University D'Amore-McKim School of Business's Online Master of Science in Business Analytics (https://damore-mckim.northeastern.edu/programs/ms-business-analytics/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=msba) prepares working professionals to lead in a business world driven by Big Data.

Make Data-Driven Business Decisions

Students build the skills to know what data to analyze and understand how to leverage that data for strategic decision making. Classwork provides exposure to data mining, statistical and quantitative analysis, multivariate testing, and predictive modeling. Students explore building sales, enhancing marketing, or strengthening a company's infrastructure.

Integrate Classroom and Professional Experiences

Through in-class case studies and a capstone project, professors share real company data so that students apply their knowledge to actual business challenges. They gain unique perspectives as they learn from renowned experts who have led through times of rapid change.

Learn From Anywhere, Anytime

Listen to lectures, access course materials, and submit assignments by deadlines in this 100 percent online program. All courses are seven weeks long, and you'll focus on one course at a time for an intensive learning experience.

Students enroll in this 30-semester-hour master's degree program for online study.

Program Requirements

Core Requirements

Code	Title	Hours
MISM 6200	Introduction to Business Analytics	3
MISM 6202	Foundations of Data Analysis for Business	3
or DADS 6400	Foundations for Data Analytics	
MISM 6205	Data Wrangling for Business	3
MISM 6210	Information Visuals and Dashboards for Business	3
or DADS 6600	Computation and Visualization for Analytics	
MISM 6212	Data Mining and Machine Learning for Business	3
or DADS 7275	Machine Learning and Data Analytics	
MISM 6213	Business Information Design, Quality, and Strategy	3
MISM 6214	Business Analytics Capstone	3

Elective Coursework

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
HRMG 6223	Global Talent Management	
MISM 6201	Database Management for Business	

MISM 6206	Modeling for Business
MKTG 6234	Marketing Analytics

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Extended Realities, MS (Boston)

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality.

This program is structured to allow students flexibility and specialization to choose a path that matches their interest. Students have an opportunity to focus on a concentration area that matches their professional background and aspirations.

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their home college. The concentrations are associated with the following colleges:

- Khoury College of Computer Sciences
 - Artificial Intelligence
 - Human Computer Interaction
- D'Amore-McKim School of Business
 - Entrepreneurship
 - Marketing
- Bouvé College of Health Sciences
 - Human Movement Science
- College of Social Sciences and Humanities
 - Information Ethics
 - Public History
- College of Engineering
 - Wireless Networking
- College of Arts, Media and Design
 - XR and Design
 - XR and Games
 - XR and Media

The Master of Science in Extended Realities welcomes students from a diverse range of backgrounds because of the applications of XR technology used in many disciplines and industries including medicine, business, entertainment, architecture, and journalism.

Some concentrations may require a technical background and are noted in the requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Extended Reality Core

Code	Title	Hours
Required Courses		
EXRE 5010 and EXRE 5011	Immersive Media: Extended Realities (XR) History, Theory, and Impact and Seminar for EXRE 5010	5
EXRE 5020	Developing Extended Realities (XR)	4
EXRE 5030	Designing Extended Realities (XR)	4
EXRE 7500 or EXRE 7990	Extended Realities (XR) Project Thesis	4
GSND 5122	Business Models in the Game Industry	1

Extended Reality Concentration Options

Complete one of the following options:

- Artificial Intelligence (p. 176)—Khoury College of Computer Sciences
- Entrepreneurship (p. 176)—D'Amore-McKim School of Business

- Human Computer Interaction (p. 176)—Khoury College of Computer Sciences
- Human Movement Science (p. 176)—Bouv  College of Health Sciences
- Information Ethics (p. 177)—College of Social Sciences and Humanities
- Marketing (p. 177)—D'Amore-McKim School of Business
- Public History (p. 177)—College of Social Sciences and Humanities
- Wireless Networking (p. 178)—College of Engineering
- XR and Design (p. 178)—College of Arts, Media and Design
- XR and Games (p. 178)—College of Arts, Media and Design
- XR and Media (p. 178)—College of Arts, Media and Design

Program Credit/GPA Requirements

34 total semester hours required. Some concentrations may require more than 34 semester hours to complete.

Minimum 3.000 GPA required

CONCENTRATION IN ARTIFICIAL INTELLIGENCE—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Requires a background in computer science.		
CS 5097	Mixed Reality	4
CS 5100	Foundations of Artificial Intelligence	4
CS 6120	Natural Language Processing	4
CS 6140	Machine Learning	4
or DS 5220	Supervised Machine Learning and Learning Theory	

CONCENTRATION IN ENTREPRENEURSHIP—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
INNO 6200	Enterprise Growth and Innovation	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
GE 5030	Iterative Product Prototyping for Engineers	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

CONCENTRATION IN HUMAN COMPUTER INTERACTION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Required Courses		
CS 5340	Computer/Human Interaction	4
Electives		
Complete 12 semester hours from the following:		12
ARTG 5710	Design for Dignity	
CS 5097	Mixed Reality	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 6350	Empirical Research Methods	
CS 7390	Special Topics in Human-Centered Computing	
GSND 6340	Biometrics of Design	

CONCENTRATION IN HUMAN MOVEMENT SCIENCE—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
Required Courses		
GSND 6340	Biometrics of Design	4
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
Electives		
Complete 7–8 semester hours from the following:		7-8
PT 5133	Kinesiology	
PT 5150	Motor Control, Development, and Learning	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 5410	Functional Human Neuroanatomy	
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	
PT 7020	Technologies in Movement and Rehabilitation Science	

CONCENTRATION IN INFORMATION ETHICS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
Electives		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MARKETING—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

CONCENTRATION IN PUBLIC HISTORY—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
HIST 5237	Issues and Methods in Public History	4
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1 (to be taken twice)	
Electives		
Complete 8 semester hours from the following:		8

HIST 5241	Exhibits and Museums
HIST 7250	Topics in Public History (Public History and Slavery)
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)

CONCENTRATION IN WIRELESS NETWORKING—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
EECE 5512	Networked XR Systems	
EECE 7374	Fundamentals of Computer Networks	
Electives		
Complete 8 semester hours from the following:		8
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	

CONCENTRATION IN XR AND DESIGN—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5640	Prototyping for Experience Design	4
EXRE 6500	Extended Realities (XR) Studio	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN XR AND GAMES—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
Electives		
Complete 8 semester hours from the following:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6001	Advanced Topics in Game Science	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6330	Player Experience	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	
GSND 6460	Generative Game Design	

CONCENTRATION IN XR AND MEDIA—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4

Elective

Complete 4 semester hours from the following:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics	
JRNL 6341	Telling Your Story with Data	

Plan of Study**Sample Plan of Study**

The following is a sample plan of study for a student in the Concentration in XR and Games.

Year 1			
Fall	Hours	Spring	Hours
EXRE 5010 and EXRE 5011		5 EXRE 5030	4
EXRE 5020		4 GSND 5110 and GSND 5111	5
		9	9
Year 2			
Fall	Hours	Spring	Hours
EXRE 6500		4 EXRE 7500	4
GSND 5122		1 XR and games elective 2	4
XR and games elective 1		4	
		9	8
Total Hours: 35			

International Management, MS (Boston)

Northeastern University D'Amore-McKim School of Business's Master of Science in International Management program is designed to prepare students to bridge local and international operations quickly and confidently.

Develop a Global Mindset

Students have an opportunity to develop critical thinking skills to handle the challenges organizations and businesses face when operating across borders and cultures. Core courses focus on cultural agility, leadership, and workforce management. Students explore topics ranging from international trade to globalization of the world economy.

Integrate Classroom and Professional Experiences

Students obtain real-world experiences that help them to gain a fresh perspective while using relevant skills. They apply their knowledge to actual business challenges through class projects.

Students can gain experience tackling real business issues faced by a company aligned with their career aspirations through the "Make Your Case" consulting program. Students build storytelling and case-writing skills while gaining inside exposure to their chosen industry.

Students may enroll in this 30-semester-hour master's degree program for full-time and part-time study.

Program Requirements**Core Requirements**

Code	Title	Hours
INTB 6200	Managing the Global Enterprise	3
INTB 6226	Becoming a Global Leader	3
In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met:		3
STRT 6210	Workforce Metrics and Analytics (or graduate-level INTB elective)	
In consultation with advisor, complete 3 graduate-level semester hours from the following for which prerequisites have been met:		3
FINA 6204	International Financial Management	
INNO 6200	Enterprise Growth and Innovation	
INTB 5000 - 6999		

INTB 6230	Global Field Study	
MKTG 6212	International Marketing	
In consultation with advisor, complete 3 graduate-level semester hours from the following for which prerequisites have been met:		3
INTB 6260	Advanced Topics in Global Management and Strategy	
STRT 6200	Strategic Decision Making in a Changing Environment	

Electives

Code	Title	Hours
In consultation with advisor, complete 15 graduate-level semester hours from the following for which prerequisites have been met:		15
ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MISM, MKTG, SCHM, and STRT		

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Management, MS (Boston)

Overview

Northeastern University D'Amore-McKim School of Business's MS in Management (https://damore-mckim.northeastern.edu/programs/ms-x/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=msx) program enables students to gain the business knowledge and specialized expertise needed to be responsible business leaders of the world capable of working, navigating, and creating in a digital environment.

Students enroll in this 30-semester-hour master's degree program for full-time, part-time, or hybrid study. There are four ways to earn this master's degree:

MS in Management: Boston Campus

MS in Management on our Boston campus allows students to personalize all aspects of their degree, including core coursework, to match their specific professional goals. Four core classes each represent a key domain: managing organizations, data-driven management, strategy and growth, and finance and operations. Students without a background in these areas have an opportunity to build foundational skills, and those with previous experience expand their knowledge in higher-level courses.

Students may focus their learning by selecting a market-aligned concentration. They'll personalize their program by selecting electives from the entire portfolio of graduate-level courses taught by D'Amore-McKim's industry-leading faculty. Or they may choose to take one elective from a diverse list of eligible graduate courses offered by other Northeastern colleges.

MS in Management with a Concentration in Digital Transformation in Healthcare or Healthcare Administration: Online Only

MS in Management for online study focuses on healthcare and leverages a unique partnership between Northeastern University and the Mayo Clinic College of Medicine and Science. Coursework provides a deep understanding of the technical skills, regulatory frameworks, and managerial competencies necessary to join the next generation of healthcare pioneers.

Students choose one of two concentrations: Digital Transformation in Healthcare or Healthcare Administration. Digital Transformation in Healthcare is designed for current healthcare executives who want to leverage emerging technologies better. Healthcare Administration offers business and healthcare knowledge tailored for those entering the industry.

MS in Management with a Concentration in Strategic Technology Leadership: Hybrid Only

MS in Management with a Concentration in Strategic Technology Leadership prepares executives and senior leaders to harness digital technology and innovation. They develop expertise in solving challenges with cutting-edge technologies and deepen their knowledge of strategies for managing technology adoption.

Students develop a project business plan under the guidance of a seasoned executive mentor. Classes are hybrid, with live online interactive courses and three in-person residencies in Boston or London.

Program Requirements

Core Requirements

Code	Title	Hours
Managing Organizations		
In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met. Choose from the following:		3
HRMG 6200	Managing People and Organizations	

HRMG 6223	Global Talent Management
INTB 6226	Becoming a Global Leader
MGMT 6213	Managing Ethics in the Workplace and Marketplace
MGMT 6214	Negotiations
MGMT 6225	Sustainability and Leadership
MGMT 6226	Sustainability and the Business Environment

Data-Driven Management

In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met. Choose from the following:

3

ACCT 6200	Financial Reporting and Managerial Decision Making 1
MISM 6200	Introduction to Business Analytics
MISM 6202	Foundations of Data Analysis for Business
MISM 6210	Information Visuals and Dashboards for Business
MISM 6212	Data Mining and Machine Learning for Business
MKTG 6200	Creating and Sustaining Customer Markets
MKTG 6234	Marketing Analytics
SCHM 6215	Supply Chain Analytics
STRT 6210	Workforce Metrics and Analytics

Strategy and Growth

In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met. Choose from the following:

3

INNO 6200	Enterprise Growth and Innovation
INNO 6222	Competing in Dynamic, Innovation-Driven Markets
INNO 6225	Acquisitions, Alliances, and Growth
INTB 6200	Managing the Global Enterprise
MKTG 6216	Market Focused Strategy
SCHM 6213	Global Supply Chain Strategy
STRT 6200	Strategic Decision Making in a Changing Environment

Finance and Operations

In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met. Choose from the following:

3

FINA 6309	Foundations of Accounting and Finance
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit
SCHM 6201	Operations and Supply Chain Management
SCHM 6214	Sourcing and Procurement
SCHM 6221	Sustainability and Supply Chain Management
SCHM 6223	Managing Healthcare Supply Chain Operations

Concentration Options

Students may complete one of the following concentrations. Not all concentrations are available at all locations; please refer to your advisor or admissions coach for the course availability each semester at your location. Courses taken to fulfill concentrations may be used toward the elective section below.

- Accounting Analytics (p. 274)
- AI Applications (p. 274)
- Analytics (p. 275)
- Brand Management (p. 275)
- Business Management for Healthcare (p. 275)
- Corporate Finance (p. 276)
- Corporate Innovation (p. 276)
- Digital Transformation in Healthcare (p. 276)
- Entrepreneurship (p. 277)
- Healthcare Administration (p. 277)
- International Business (p. 277)
- Investments (p. 278)

- Leading People and Organizations (p. 278)
- Marketing (p. 278)
- Marketing Analytics (p. 279)
- Operations and Supply Chain Management (p. 279)
- Public Health (p. 279)
- Strategic Technology Leadership (p. 279)
- Sustainability and Business (p. 280)

Electives

Code	Title	Hours
In consultation with advisor, complete 18 graduate-level semester hours for which prerequisites have been met. Choose from the following subject codes:		18
ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MISM, MKTG, SCHM, STRT		
In consultation with advisor, students may also select an interdisciplinary elective, for which prerequisites have been met, offered in partnership with other Northeastern University colleges. Choose from the following:		
AACE 6000	Arts and Culture Organizational Leadership	
ARTG 5150	Information Visualization Principles and Practices	
ARTG 5151	Information Design Critique Seminar	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	
BINF 6200	Bioinformatics Programming	
BINF 6308	Bioinformatics Computational Methods 1	
BINF 6309	Bioinformatics Computational Methods 2	
BIOT 5120	Foundations in Biotechnology	
BIOT 5219	The Biotechnology Enterprise	
BIOT 6214	Experimental Design and Biostatistics	
CAEP 6326	Behavioral Concepts and Principles	
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
ECON 5140	Applied Econometrics	
GE 5030	Iterative Product Prototyping for Engineers	
GE 5100	Product Development for Engineers	
GSND 5110	Game Design and Analysis	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5105	The American Healthcare System	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
IE 5617	Lean Concepts and Applications	
IE 5640	Data Mining for Engineering Applications	
IE 6200	Engineering Probability and Statistics	
IE 6600	Computation and Visualization for Analytics	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
INSH 5301	Introduction to Computational Statistics	

INSH 5302	Information Design and Visual Analytics
JRNL 5311	Design for Storytelling
JRNL 5400	Media and Advocacy in Theory and Practice
JRNL 6305	Topics
JRNL 6340	Fundamentals of Digital Journalism
JRNL 6341	Telling Your Story with Data
PHIL 5001	Global Justice
PHIL 5005	Information Ethics
PHIL 5010	AI Ethics
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

ACCOUNTING ANALYTICS CONCENTRATION

Code	Title	Hours
Required		
MISM 6200	Introduction to Business Analytics	3
MISM 6202	Foundations of Data Analysis for Business	3
MISM 6205	Data Wrangling for Business	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
ACCT 6203	Business Entity Taxation	
ACCT 6205	Auditing in a Big Data Environment	
ACCT 6207	Contemporary and Emerging Issues in Financial Reporting	
ACCT 6217	Corporate Governance, Ethics, and Financial Reporting	
ACCT 6231	Corporations and Shareholders	
ACCT 6235	Partners and Partnerships	
ACCT 6345	Financial Accounting and Report Framework and Concepts	
MISM 6210	Information Visuals and Dashboards for Business	
EEBA 6401	Experiential Business Decision Making (repeated 3 times)	
EEBA 6410	Workplace Skills in Action	

AI APPLICATIONS CONCENTRATION

Code	Title	Hours
Required		
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4
Electives		
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met. Choose from the following:		4
EDUT 6150	AI in Education	
HLTH 5800	AI Across the Health Sciences	
IE 5640	Data Mining for Engineering Applications	
JRNL 6460	AI in Media Industries	
MISM 6250	Strategic AI for Business	

ANALYTICS CONCENTRATION

Code	Title	Hours
Required		
MISM 6200	Introduction to Business Analytics	3
Electives		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
MISM 6201	Database Management for Business	
MISM 6202	Foundations of Data Analysis for Business	
MISM 6205	Data Wrangling for Business	
MISM 6206	Modeling for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	

BRAND MANAGEMENT CONCENTRATION

Code	Title	Hours
Required		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6223	Brand and Advertising Management	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6287	Succeeding in the Platform Economy	

BUSINESS MANAGEMENT FOR HEALTHCARE CONCENTRATION

Code	Title	Hours
Required		
FINA 6220 or SCHM 6223	Healthcare Finance Managing Healthcare Supply Chain Operations	3
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3
Optional Electives		
Note: Electives are not required; the following course(s) are suggested beyond the concentration:		
ENTR 6214	Social Enterprise	
FINA 6220	Healthcare Finance	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
MGMT 6214	Negotiations	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	

CORPORATE FINANCE CONCENTRATION

Code	Title	Hours
Required		
FINA 6200	Value Creation through Financial Decision Making	3
FINA 6205	Financial Strategy	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
FINA 6204	International Financial Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	

CORPORATE INNOVATION CONCENTRATION

Code	Title	Hours
Electives		
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met. Choose from the following:		12
ARTG 5610	Design Systems	
GE 5100	Product Development for Engineers	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
HRMG 6280	The Human Side of Innovation	
INNO 6200	Enterprise Growth and Innovation	
INNO 6217	Lean Innovation	
INNO 6222	Competing in Dynamic, Innovation-Driven Markets	
INNO 6225	Acquisitions, Alliances, and Growth	
INNO 6227	Digital Bias in Business	

DIGITAL TRANSFORMATION IN HEALTHCARE CONCENTRATION

Code	Title	Hours
To earn the Concentration in Digital Transformation in Healthcare, students must complete the following four core courses of the core curriculum of this program:		
MGMT 6213	Managing Ethics in the Workplace and Marketplace	
MISM 6200	Introduction to Business Analytics	
SCHM 6223	Managing Healthcare Supply Chain Operations	
STRT 6220	Strategic Management for Healthcare Organizations	
Required		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 6404	Patient Engagement Informatics and Analytics	3
INNO 6200	Enterprise Growth and Innovation	3
MGSC 6281	Service Innovation and Management	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
FINA 6220	Healthcare Finance	
or FINA 6309	Foundations of Accounting and Finance	
HINF 5105	The American Healthcare System	
HRMG 6220	Health Organization Management	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	

ENTREPRENEURSHIP CONCENTRATION

Code	Title	Hours
Electives		
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met. Choose from the following:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6340	The Technical Entrepreneur as Leader	
GE 5030	Iterative Product Prototyping for Engineers	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

HEALTHCARE ADMINISTRATION CONCENTRATION

Code	Title	Hours
To earn the Concentration in Healthcare Administration, students must complete the following four core courses of the core curriculum of this program:		
FINA 6309 or SCHM 6223	Foundations of Accounting and Finance Managing Healthcare Supply Chain Operations	
MGMT 6213	Managing Ethics in the Workplace and Marketplace	
MISM 6200	Introduction to Business Analytics	
STRT 6220	Strategic Management for Healthcare Organizations	
Required		
HRMG 6200	Managing People and Organizations	3
HRMG 6223	Global Talent Management	3
INNO 6200	Enterprise Growth and Innovation	3
MGMT 6214	Negotiations	2-3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
FINA 6309	Foundations of Accounting and Finance (If not taken towards concentration core)	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5105	The American Healthcare System	
HINF 6404	Patient Engagement Informatics and Analytics	
HRMG 6220	Health Organization Management	
HRMG 6230	Leading a Diverse and Inclusive Organization	
MGSC 6281	Service Innovation and Management	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
SCHM 6223	Managing Healthcare Supply Chain Operations (If not taken towards concentration core)	
STRT 6210	Workforce Metrics and Analytics	

INTERNATIONAL BUSINESS CONCENTRATION

Code	Title	Hours
Required		
INTB 6200	Managing the Global Enterprise	3
Electives		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
INTB 6212	Cultural Aspects of International Business	

INTB 6226	Becoming a Global Leader
INTB 6230	Global Field Study
INTB 6249	Digitization of International Business
STRT 6224	Managing the Sustainable Global Enterprise

INVESTMENTS CONCENTRATION

Code	Title	Hours
Required		
FINA 6200	Value Creation through Financial Decision Making	3
FINA 6203	Investment Analysis	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
FINA 6211	Financial Risk Management	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6339	Quantitative Portfolio Management	

LEADING PEOPLE AND ORGANIZATIONS CONCENTRATION

Code	Title	Hours
Required		
HRMG 6200	Managing People and Organizations	3
Electives		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
HRMG 6218	Great Companies	
HRMG 6220	Health Organization Management	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
HRMG 6223	Global Talent Management	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	
STRT 6224	Managing the Sustainable Global Enterprise	

MARKETING CONCENTRATION

Code	Title	Hours
Required		
MKTG 6200	Creating and Sustaining Customer Markets	3
Electives		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
MKTG 6287	Succeeding in the Platform Economy	

MARKETING ANALYTICS CONCENTRATION

Code	Title	Hours
Required		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6234	Marketing Analytics	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

OPERATIONS AND SUPPLY CHAIN MANAGEMENT CONCENTRATION

Code	Title	Hours
Required		
SCHM 6201	Operations and Supply Chain Management	3
SCHM 6213	Global Supply Chain Strategy	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
SCHM 6211	Logistics and Transportation Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

PUBLIC HEALTH CONCENTRATION

Code	Title	Hours
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 6208	Foundations of Community Health Assessment	3

STRATEGIC TECHNOLOGY LEADERSHIP CONCENTRATION

Code	Title	Hours
To earn the Concentration in Strategic Technology Leadership, students must complete the following four core courses of the core curriculum of this program:		
INNO 6222	Competing in Dynamic, Innovation-Driven Markets	
INTB 6226	Becoming a Global Leader	
MISM 6212	Data Mining and Machine Learning for Business	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
Required		
Complete the following course three times:		6
INNO 6250	Integrated and Applied Technology Leadership Project	
Complete the following:		
INNO 6240	Strategic Disruption Residency 1	1
INNO 6241	Strategic Disruption Residency 2	1
INNO 6242	Strategic Disruption Residency 3	1
INNO 6254	Technology and the Law	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MKTG, MISM, SCHM, or STRT		

Students may also select preapproved interdisciplinary electives, for which prerequisites have been met, offered in partnership with other Northeastern University colleges.

SUSTAINABILITY AND BUSINESS CONCENTRATION

Code	Title	Hours
Required		
MECN 6200	Global Competition and Market Dominance	3
Electives		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	
STRT 6224	Managing the Sustainable Global Enterprise	

Plan of Study

Not all concentrations are available at all locations; please refer to your advisor or admissions coach for the course availability each semester at your location.

Sample Plans of Study

MS IN MANAGEMENT, BOSTON CAMPUS, 12 MONTHS

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
Core area course 1		3 Core area course 3		3 Core area course 4	3
Core area course 2		3 Concentration course 2 or elective		3 Concentration course 4 or elective	3
Concentration course 1 or elective		3 Concentration course 3 or elective		3 Elective	3
		Elective		3	
		9		12	9

Total Hours: 30

MS IN MANAGEMENT, BOSTON CAMPUS, 16 MONTHS

Year 1					
Fall	Hours	Spring	Hours		
Core area course 1		3 Core area course 3			3
Core area course 2		3 Concentration course 2 or elective			3
Concentration course 1 or elective		3 Concentration course 3 or elective			3
		Elective			3
		9			12

Year 2					
Fall	Hours				
Core area course 4		3			
Concentration course 4 or elective		3			
Elective		3			
		9			

Total Hours: 30

MS IN MANAGEMENT WITH CONCENTRATION IN DIGITAL TRANSFORMATION, ONLINE ONLY

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
INNO 6200		3 MISM 6200		3 MGMT 6213	3
STRT 6220		3 HINF 6404		3 Elective	3

MGSC 6281	3	SCHM 6223	3
Elective	3	HINF 5101	3
	12		12
			6

Total Hours: 30

MS IN MANAGEMENT WITH CONCENTRATION IN HEALTHCARE ADMINISTRATION, ONLINE ONLY

Year 1						
Fall	Hours	Spring	Hours	Summer Full Semester	Hours	
INNO 6200		3	MISM 6200	3	MGMT 6213	3
STRT 6220		3	HRMG 6222	3	Elective	3
HRMG 6200		3	MGMT 6214	3		
FINA 6309 (or elective)		3	SCHM 6214 (or elective)	3		
		12		12		6

Total Hours: 30

MS IN MANAGEMENT WITH CONCENTRATION IN STRATEGIC TECHNOLOGY LEADERSHIP, ONLINE WITH ON-CAMPUS RESIDENCIES

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
INNO 6222		3 MKTG 6230		3 Elective	3
INTB 6226		3 MISM 6212		3 Elective	3
INNO 6250		2 INNO 6250		2	
INNO 6240		1 INNO 6241		1	
		9		9	6
Year 2					
Fall	Hours				
INNO 6242		1			
INNO 6250		2			
INNO 6254		3			
		6			

Total Hours: 30

¹ Students will take courses online but will be required to attend an on-campus residency in Boston and/or London.

Management, MS with Major in Fintech Management (Miami)

The Master of Science in Management with Major in Fintech Management focuses on finance and leverages technology to help develop financial services. Four core classes each represent a key domain: managing organizations, data-driven management, strategy and growth, and finance and operations. Students without a background in these areas have an opportunity to build foundational skills, and those with previous experience expand their knowledge in higher-level courses.

Prerequisite Course

Applicants without a prior degree or prior background in finance are required to complete the following course with a grade of C– or better before admission to the program:

Code	Title	Hours
FINA 6200	Value Creation through Financial Decision Making	3

Program Requirements

Core Requirements

Code	Title	Hours
Managing Organizations		
MGMT 6413	Managing Ethics in the Workplace and Marketplace	4
Data-Driven Management		
FINA 6403	Investment Analytics	4
FINA 6433	Fundamentals of Programming for Finance	2

MISM 6402	Foundations of Data Analysis for Business	2
Strategy and Growth		
INNO 6400	Enterprise Growth and Innovation	2
Finance and Operations		
MKTG 6430	Driving Marketing Performance: Measure, Analyze, Profit	2

Fintech Management Major Requirements

Code	Title	Hours
In consultation with advisor, complete 14 semester hours from the following:		14
FINA 6432	Fundamentals of Financial Math and Financial Markets	
FINA 6437	Fintech, Financial Innovation, and Blockchain	
FINA 6440	Financial Markets and Banking in the Post Financial Crisis Era	
FINA 6443	Credit Risk Management	
MISM 6410	Information Visuals and Dashboards for Business	

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Accounting, MSA (Boston)

Northeastern University D'Amore-McKim School of Business's Master of Science in Accounting is designed to prepare students for a career in the rapidly evolving accounting industry.

Build Deep Accounting Expertise

Students build on their undergraduate accounting major and have an opportunity to gain the knowledge, skills, and credit hours needed to pursue CPA licensure and launch their careers in just seven months. Classwork deepens their expertise through advanced accounting topics, management best practices, and data analytics skills. The Board of Public Accountancy in Massachusetts has approved the program curriculum.

Select a Track

Students may specialize in either audit or tax, guiding them toward the career that best suits their goals. The audit track offers intense exposure to ethics, auditing research, and forensic accounting. The tax track explores the intricacies of the tax industry so that students may gain a comprehensive understanding of taxation at all levels, from local to international.

Integrate Classroom and Professional Experiences

Students have opportunities to obtain real-world experiences that help them gain a fresh perspective while using relevant skills. They apply their knowledge to actual business challenges through class projects. Students gain unique perspectives as they learn from industry-leading faculty with years of practice as both PhDs and CPAs at Big 4 and other public accounting firms.

Students enroll in this 30-semester-hour master's degree program for full-time study.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Accounting		
ACCT 6203	Business Entity Taxation	3
ACCT 6204	Financial Reporting for Integrated Multinational Enterprises	3
ACCT 6229	Accounting for Foreign Currency Transactions	1
Ethics		
ACCT 6253	Ethics in the Accounting Profession	3
Financial Reporting		
ACCT 6207	Contemporary and Emerging Issues in Financial Reporting	3
ACCT 6216	Financial Reporting for Governments and Nonprofit Entities	2

Tracks

Complete one of the following tracks:

AUDIT TRACK

Code	Title	Hours
ACCT 6205	Auditing in a Big Data Environment	3
ACCT 6217	Corporate Governance, Ethics, and Financial Reporting	3
ACCT 6254	Accounting Research and Communication	3

TAXATION TRACK

Code	Title	Hours
ACCT 6231	Corporations and Shareholders	3
ACCT 6235	Partners and Partnerships	3
ACCT 6254	Accounting Research and Communication	3

Electives

Code	Title	Hours
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		6
ACCT 5255	Forensic Accounting	
ACCT 5256	Internal Auditing	
ACCT 6239	State and Local Taxation	
ACCT 6240	International Taxation: Inbound Transactions	
ACCT 6243	Advanced Flow-Through Entities	
ACCT 6248	Income Taxation of Trusts and Estates	
ACCT 6292	Tax Research, Practice, and Ethics	

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Accounting and Business Administration, MSAMBA (Boston)

Northeastern University D'Amore-McKim School of Business' Master of Science in Accounting/Master of Business Administration (<https://damore-mckim.northeastern.edu/programs/ms-accounting-mba/>) combined-degree program puts nonaccounting majors on an accelerated path toward a successful career in accounting.

Cultivate Deep Accounting Knowledge and Fundamental Business Skills

This 15-month curriculum is constructed in partnership with some of the leading accounting firms. Students will build knowledge in both accounting and business, including a four-course concentration in business analytics.

Analytics Concentration

Students will develop their analytical skills through an MBA concentration in analytics. Through four courses students use data to support business decision making and create a measurable improvement on organizational performance.

Integrate Classroom and Professional Experiences

Students will have opportunities to obtain real-world experiences that help them gain a fresh perspective while using relevant skills. They apply their knowledge to actual business challenges through class projects. Starting in January, students leverage their newly acquired skills in a three-month paid corporate residency at a Big 4 or another top accounting firm. Far removed from the typical internship, students work full-time as an associate and have significant responsibilities to deliver on organizational goals.

Students may enroll in this 68-semester-hour master's degree program for full-time study.

Program Requirements**Business Administration Core Requirements**

Code	Title	Hours
Marketing		
MKTG 6318	Customer Value and the Enterprise	2
Strategic Decision Making		
STRT 6318	Strategic Planning for the Future	2
Management		
FINA 6318	Financial Management	2
HRMG 6318	Managing the Organization	2

SCHM 6318	Managing Operations and the Supply Chain	2
Innovation and Social Impact		
INNO 6318	Innovation Driven Strategy	2
MGMT 6211	Business Law and Professional Ethics	2

Accounting Requirements

Code Required	Title	Hours
ACCT 6223	Audit and Other Assurance Services	6
ACCT 6224	Taxation of Individuals and Business Entities	6
ACCT 6226	Strategic Cost Management	3
ACCT 6227	Accounting for Business Combinations	3
ACCT 6228	Contemporary Issues in Accounting Theory	3
Financial Reporting		
ACCT 6217	Corporate Governance, Ethics, and Financial Reporting	3
ACCT 6220	Corporate Financial Reporting and Decision Making 1	3
ACCT 6221	Corporate Financial Reporting and Decision Making 2	6
ACCT 6222	Corporate and Governmental/Nonprofit Financial Reporting and Decision Making	6

Analytics Concentration Requirements

Code Required	Title	Hours
BUSN 6365	Business Analytics	3
MGSC 6201	Information Systems and Technology	3
MISM 6210	Information Visuals and Dashboards for Business	3
MISM 6212	Data Mining and Machine Learning for Business	3

Elective

Code	Title	Hours
Open Elective		
In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites are met. Choose from the following subject codes:		3
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE		

Corporate Residency Requirement

Code	Title	Hours
BUSN 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

68 total semester hours required

Minimum 3.000 GPA required

Finance, MSF (Boston)

Northeastern University D'Amore-McKim School of Business' Master of Science in Finance (https://damore-mckim.northeastern.edu/programs/ms-finance/?utm_medium=website&utm_source=catalog&utm_campaign=ptmsf) helps students cultivate the high-level knowledge needed to drive financial strategy in today's tech economy.

Develop Deep Finance Expertise

Core courses and elective offerings help students become financial experts with the skills to diversify financial portfolios, effectively minimize risks, maximize return on investments, and sustain growth. Students interested in pursuing the Chartered Financial Analyst designation will find CFA preparations integrated into their coursework.

Integrate Classroom and Professional Experiences

Students will have opportunities to obtain real-world experiences that help them gain a fresh perspective while using relevant skills. They apply their knowledge to actual business challenges through class projects.

Students can apply to participate in a student-managed mutual fund, The 360 Huntington Fund, where they gain valuable experience performing equity research and portfolio management. By participating in the Fund, students may earn one semester hour per semester with the option to fulfill a 3 semester hours elective course requirement by participating for three terms.

Students enroll in this 30-semester-hour master's degree program for part-time study.

Program Requirements

Core Requirements

Code	Title	Hours
FINA 6200	Value Creation through Financial Decision Making	3
FINA 6202	Analysis of Financial Institutions and Markets	3
FINA 6203	Investment Analysis	3
FINA 6204	International Financial Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3

Electives

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met:		12
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6220	Healthcare Finance	
FINA 6292	Advanced Topics in Finance	
FINA 6360	Fund Management for Analysts	
FINA 6361	Fund Management for Managers	

A maximum of one graduate-level business course may be taken from the following subject codes:

ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MKTG, SCHM, and STRT

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Quantitative Finance, MSF (Boston)

Northeastern University D'Amore-McKim School of Business's Full-Time MS in Quantitative Finance is designed to prepare students to thrive in a rapidly changing finance industry transformed by technology and innovation.

Cultivate Advanced Finance and Fintech Skills

This quantitative finance curriculum emphasizes the intersection of finance and data analytics. Coursework integrates economics, mathematics, and computer science with financial theory and application. Students interested in pursuing the Chartered Financial Analyst designation will find CFA preparations integrated into their coursework.

Integrate Classroom and Professional Experiences

Students will have opportunities to obtain real-world experiences that help them gain a fresh perspective while using relevant skills. Through an optional graduate co-op, students translate ideas into action as they complete a project for an organization.

Students can apply to participate in a student-managed mutual fund, The 360 Huntington Fund (https://damore-mckim.northeastern.edu/programs/360-huntington-fund/?utm_medium=website&utm_source=catalog&utm_campaign=msqf), where they can gain experience performing equity research and portfolio management. By participating in the Fund, students may earn 1 semester hour per semester with the option to fulfill a 3-semester-hour elective course requirement by participating for three terms.

Complete the Degree in as Few as 12 Months

In the first two semesters, students complete six required courses, one elective, and an optional career development program developed by the Graduate Career Center advisors. They may complete the remaining three elective courses over the summer term or extend their studies and complete their electives in the fall term.

Students enroll in this 30-semester-hour master's degree program for full-time study.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
FINA 6203	Investment Analysis	3
FINA 6331	Corporate Finance	3
FINA 6332	Fundamentals of Financial Math and Financial Markets	3
FINA 6333	Data Analytics in Finance	3
FINA 6334	Empirical Methods in Finance	3
FINA 6335	Derivatives and Risk Analytics	3

Electives

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours from the following for which prerequisites have been met:		12
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
ECON 5140	Applied Econometrics	
FINA 6204	International Financial Management	
FINA 6207	Financial Modeling	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
INTB 6230	Global Field Study	
FINA 6336	Fixed-Income Securities and Derivatives	
FINA 6337	Computational Methods in Finance	
FINA 6338	Alternative Investments	
FINA 6339	Quantitative Portfolio Management	
FINA 6340	Financial Markets and Banking in the Postcrisis Era	
FINA 6342	Financial Data and Fintech	
FINA 6360	Fund Management for Analysts	
FINA 6361	Fund Management for Managers	

Optional Career Management Course

Code	Title	Hours
BUSN 6200	Career Management	0

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Quantitative Finance, MSF (Oakland)

Admissions to this program have been suspended.

Northeastern University D'Amore-McKim School of Business's Full-Time MS in Quantitative Finance is designed to prepare students to thrive in a rapidly changing finance industry transformed by technology and innovation.

Cultivate Advanced Finance and Fintech Skills

This quantitative finance curriculum emphasizes the intersection of finance and data analytics. Coursework integrates economics, mathematics, and computer science with financial theory and application. Students interested in pursuing the Chartered Financial Analyst designation will find CFA preparations integrated into their coursework.

Integrate Classroom and Professional Experiences

Students will have opportunities to obtain real-world experiences that help them gain a fresh perspective while using relevant skills. Through an optional graduate co-op, students translate ideas into action as they complete a project for an organization.

Students can apply to participate in a student-managed mutual fund, The 360 Huntington Fund (https://damore-mckim.northeastern.edu/programs/360-huntington-fund/?utm_medium=website&utm_source=catalog&utm_campaign=msqf), where they can gain experience performing equity research and portfolio management. By participating in the Fund, students may earn 1 semester hour per semester with the option to fulfill a 3-semester-hour elective course requirement by participating for three terms.

Complete the Degree in as Few as 12 Months

In the first two semesters, students complete six required courses, one elective, and an optional career development program developed by the Graduate Career Center advisors. They may complete the remaining three elective courses over the summer term or extend their studies and complete their electives in the fall term.

Students enroll in this 30-semester-hour master's degree program for full-time study.

Program Requirements

Core Requirements

Code	Title	Hours
FINA 6203	Investment Analysis	3
FINA 6331	Corporate Finance	3
FINA 6332	Fundamentals of Financial Math and Financial Markets	3
FINA 6333	Data Analytics in Finance	3
FINA 6334	Empirical Methods in Finance	3
FINA 6335	Derivatives and Risk Analytics	3

Electives

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours from the following for which prerequisites have been met:		12
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
ECON 5140	Applied Econometrics	
FINA 6204	International Financial Management	
FINA 6207	Financial Modeling	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
INTB 6230	Global Field Study	
FINA 6336	Fixed-Income Securities and Derivatives	
FINA 6337	Computational Methods in Finance	
FINA 6338	Alternative Investments	
FINA 6339	Quantitative Portfolio Management	
FINA 6340	Financial Markets and Banking in the Postcrisis Era	
FINA 6342	Financial Data and Fintech	
FINA 6360	Fund Management for Analysts	
FINA 6361	Fund Management for Managers	

Optional Career Management Course

Code	Title	Hours
BUSN 6200	Career Management	0

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Master of Business Administration

At Northeastern University's D'Amore-McKim School of Business, we prepare students to be responsible global business leaders who thrive in a digital world. In our MBA programs (<https://damore-mckim.northeastern.edu/catalog-mba-programs/>), students learn across borders and get ready to make a real impact. They develop in-demand skills by working on projects with actual company data, guided by a faculty of consultants, management leaders, and startup founders. This hands-on approach helps them become innovative leaders.

At D'Amore-McKim, we excel at integrating classroom instruction with real-world, experience-powered learning. This approach broadens students' knowledge, fosters their creativity, and equips them to meet the evolving demands of today's business landscape. Our MBA students dive into experiences that provide fresh perspectives and valuable skills.

Programs

- Business Administration, MBA—Full-Time (Boston) (p. 288)
- Business Administration, MBA—Online (p. 297)
- Business Administration, MBA—Part-Time (Boston) (p. 298)

Business Administration, MBA—Full-Time (Boston)

The Northeastern University D'Amore-McKim School of Business Full-Time MBA (https://damore-mckim.northeastern.edu/programs/full-time-mba/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=ftmba) program is designed to prepare students to lead with impact. Our Full-Time MBA program integrates business knowledge with a deep understanding of technology, preparing students to stay ahead of change and become the leaders that today's business world demands. Students will choose from a wide-ranging list of in-demand electives and concentrations—including our signature MBA x concentrations—allowing them to develop a unique nonbusiness skill set.

Integrate Classroom and Professional Experiences

Learning by doing is a hallmark of a Northeastern MBA. Students apply their knowledge to actual business challenges through experience-fueled electives and class projects. Through a corporate residency, students translate ideas to action for 3, 6, or up to 12 months. Far removed from the typical internship, students work full time at a leading firm or startup in their field and have significant responsibilities as they work to deliver on organizational goals.

Select Two Concentrations

Students will specialize their degree by selecting two in-demand business concentrations. Or, they could choose to add expertise in another professional area by choosing an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

Build an Interdisciplinary Skill Set

Students will select 6 interdisciplinary (nonbusiness) semester hours of their choice. They can mix and match the content that interests them from a diverse list of eligible graduate courses across Northeastern colleges.

Program Requirements

Core Requirements

Code	Title	Hours
Marketing		
MKTG 6318	Customer Value and the Enterprise	2
Strategic Decision Making		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	2
STRT 6318	Strategic Planning for the Future	2
Management		
FINA 6318	Financial Management	2
HRMG 6318	Managing the Organization	2
SCHM 6318	Managing Operations and the Supply Chain	2
Innovation and Social Impact		
BUSN 6363	Social Impact of Business	2
INNO 6318	Innovation Driven Strategy	2
Career Management		

BUSN 6200	Career Management	0
BUSN 6950	MBA Skills Workshop	0
Corporate Residency		
BUSN 6954	Co-op Work Experience - Half-Time	0
BUSN 6964	Co-op Work Experience	0
BUSN 6970	Professional Projects	0
Three-month, six-month, or up to two six-month corporate residency options		

Concentration Options

Complete two of the following concentrations:

- AI Applications (p. 291)
- Analytics (p. 291)
- Brand Management (p. 291)
- Business Management for Healthcare (p. 291)
- Corporate Finance (p. 292)
- Corporate Innovation (p. 292)
- Entrepreneurship (p. 293)
- International Business (p. 293)
- Investments (p. 293)
- Leading People and Organizations (p. 294)
- Marketing (p. 294)
- Marketing Analytics (p. 294)
- Operations and Supply Chain Management (p. 294)
- Sustainability and Business (p. 295)
- MBA x Artificial Intelligence (p. 295)
- MBA x Bioinformatics (p. 295)
- MBA x Cybersecurity (p. 295)
- MBA x Data Science (p. 295)
- MBA x Data Visualization (p. 295)
- MBA x Experience Design (p. 295)
- MBA x Extended Realities (p. 296)
- MBA x Game Design (p. 296)
- MBA x Game Science (p. 296)
- MBA x Information Ethics (p. 296)
- MBA x Media Innovation and Advocacy (p. 297)
- MBA x Public Health (p. 297)
- MBA x Software Development (p. 297)

ELECTIVE

Code	Title	Hours
Experiential Requirement		
In consultation with advisor, complete 3 semester hours from the following:		3
BUSN 6351	Experiential Education	
BUSN 6945	Washington Campus Seminar	
ENTR 5000	New Venture Development	
FINA 6360	Fund Management for Analysts	
FINA 6361	Fund Management for Managers	
INTB 6230	Global Field Study	
INTB 6238	Global Project	
MKTG 6606	Digital, Analytics, Technology, and Automation Advanced Research Practicum	

Open Electives

In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:	6
ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MISM, MKTG, SCHM, and STRT	

Interdisciplinary Requirement

In consultation with advisor, complete 6 graduate-level semester hours, for which requirements have been met, offered in partnership with other Northeastern University colleges:

6

AACE 6000	Arts and Culture Organizational Leadership
ARTG 5150	Information Visualization Principles and Practices
ARTG 5151	Information Design Critique Seminar
ARTG 5330	Visualization Technologies 1: Fundamentals
ARTG 5600	Experience Design Studio 1: Principles
ARTG 5610	Design Systems
ARTG 5620	Notational Systems for Experience
ARTG 5640	Prototyping for Experience Design
ARTG 6110	Information Design Theory and Critical Thinking
ARTG 6310	Design for Behavior and Experience
ARTG 6330	Information Design Mapping Strategies
BINF 6200	Bioinformatics Programming
BINF 6308	Bioinformatics Computational Methods 1
BINF 6309	Bioinformatics Computational Methods 2
BIOT 5120	Foundations in Biotechnology
BIOT 5219	The Biotechnology Enterprise
BIOT 6214	Experimental Design and Biostatistics
CAEP 6326	Behavioral Concepts and Principles
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
ECON 5140	Applied Econometrics
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
GSND 5110	Game Design and Analysis
GSND 6320	Psychology of Play
GSND 6340	Biometrics of Design
GSND 6350	Data-Driven Game Design
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5105	The American Healthcare System
HINF 6202	Business of Healthcare Informatics
HINF 6205	Creation and Application of Medical Knowledge
IE 5617	Lean Concepts and Applications
IE 5640	Data Mining for Engineering Applications
IE 6200	Engineering Probability and Statistics
IE 6600	Computation and Visualization for Analytics
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
JRNL 5311	Design for Storytelling
JRNL 5400	Media and Advocacy in Theory and Practice
JRNL 6305	Topics
JRNL 6340	Fundamentals of Digital Journalism
JRNL 6341	Telling Your Story with Data
PHIL 5001	Global Justice
PHIL 5005	Information Ethics
PHIL 5010	AI Ethics
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy

Program Credit/GPA Requirements

55 total semester hours required
Minimum 3.000 GPA required

CONCENTRATION IN AI APPLICATIONS

Code	Title	Hours
Required		
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4
Electives		
Complete one of the following:		4
EDUT 6150	AI in Education	
HLTH 5800	AI Across the Health Sciences	
IE 5640	Data Mining for Engineering Applications	
JRNL 6460	AI in Media Industries	
MISM 6250	Strategic AI for Business	

CONCENTRATION IN ANALYTICS

Code	Title	Hours
Required		
BUSN 6365	Business Analytics	3
Electives		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		9
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
ECON 5140	Applied Econometrics	
IE 6600	Computation and Visualization for Analytics	
INSH 5302	Information Design and Visual Analytics	
MISM 6201	Database Management for Business	
MISM 6205	Data Wrangling for Business	
MISM 6206	Modeling for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	

CONCENTRATION IN BRAND MANAGEMENT

Code	Title	Hours
Required		
MKTG 6223	Brand and Advertising Management	3
MKTG 6320	Advanced Marketing Management	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		6
MKTG 6120	Graduate Research Practicum in Marketing	
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	

MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit
MKTG 6287	Succeeding in the Platform Economy

CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE

Code	Title	Hours
Required		
FINA 6220	Healthcare Finance	3
or SCHM 6223	Managing Healthcare Supply Chain Operations	
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3
Optional Electives		

Note: Electives are not required; the following course(s) are suggested beyond the concentration: 3–9

ENTR 6214	Social Enterprise
FINA 6220	Healthcare Finance
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 6202	Business of Healthcare Informatics
HINF 6205	Creation and Application of Medical Knowledge
MGMT 6214	Negotiations
MKTG 6218	Managing Customer Engagement in a Service World
MKTG 6226	Consumer Behavior
PTH 5232	Evaluating Healthcare Quality
PTH 5234	Economic Perspectives on Health Policy
SCHM 6223	Managing Healthcare Supply Chain Operations

CONCENTRATION IN CORPORATE FINANCE

Code	Title	Hours
Required		
FINA 6320	Advanced Financial Management	3
In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met:		3
FINA 6203	Investment Analysis	
FINA 6216	Valuation and Value Creation	

Electives		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		6
FINA 6203	Investment Analysis	
FINA 6204	International Financial Management	
FINA 6205	Financial Strategy	
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6342	Financial Data and Fintech	
MECN 6200	Global Competition and Market Dominance	

CONCENTRATION IN CORPORATE INNOVATION

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met:		12
ARTG 5610	Design Systems	
GE 5100	Product Development for Engineers	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
HRMG 6280	The Human Side of Innovation	
INNO 6217	Lean Innovation	

INNO 6222	Competing in Dynamic, Innovation-Driven Markets
INNO 6225	Acquisitions, Alliances, and Growth
INNO 6227	Digital Bias in Business
INNO 6230	Platform Innovation
MGSC 6281	Service Innovation and Management

CONCENTRATION IN ENTREPRENEURSHIP

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
ENTR 6340	The Technical Entrepreneur as Leader	
GE 5030	Iterative Product Prototyping for Engineers	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

CONCENTRATION IN INTERNATIONAL BUSINESS

Code	Title	Hours
Required		
INTB 6200	Managing the Global Enterprise	3
Electives		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		9
FINA 6204	International Financial Management	
INTB 6212	Cultural Aspects of International Business	
INTB 6224	Competing to Win in Emerging Markets	
INTB 6226	Becoming a Global Leader	
INTB 6230	Global Field Study	
INTB 6238	Global Project	
INTB 6260	Advanced Topics in Global Management and Strategy	
MKTG 6212	International Marketing	
STRT 6224	Managing the Sustainable Global Enterprise	

CONCENTRATION IN INVESTMENTS

Code	Title	Hours
Required		
FINA 6203	Investment Analysis	3
FINA 6320	Advanced Financial Management	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		6
FINA 6204	International Financial Management	
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6339	Quantitative Portfolio Management	

FINA 6342	Financial Data and Fintech
FINA 6360	Fund Management for Analysts
FINA 6361	Fund Management for Managers
MECN 6200	Global Competition and Market Dominance

CONCENTRATION IN LEADING PEOPLE AND ORGANIZATIONS

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met:		12
HRMG 6218	Great Companies	
HRMG 6221	Power and Influence	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
HRMG 6223	Global Talent Management	
HRMG 6230	Leading a Diverse and Inclusive Organization	
HRMG 6280	The Human Side of Innovation	
INTB 6226	Becoming a Global Leader	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	
STRT 6224	Managing the Sustainable Global Enterprise	
Note: Only one course outside HRMG and MGMT may be taken to fulfill the concentration.		

CONCENTRATION IN MARKETING

Code	Title	Hours
Required		
MKTG 6320	Advanced Marketing Management (Advanced Marketing Management)	3
Electives		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		9
MKTG 6120	Graduate Research Practicum in Marketing	
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
MKTG 6287	Succeeding in the Platform Economy	

CONCENTRATION IN MARKETING ANALYTICS

Code	Title	Hours
Required		
MKTG 6234	Marketing Analytics	3
MKTG 6320	Advanced Marketing Management (Advanced Marketing Management)	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		6
MKTG 6120	Graduate Research Practicum in Marketing	
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

CONCENTRATION IN OPERATIONS AND SUPPLY CHAIN MANAGEMENT

Code	Title	Hours
Required		
SCHM 6213	Global Supply Chain Strategy	3

Electives

In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		9
SCHM 6211	Logistics and Transportation Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

CONCENTRATION IN SUSTAINABILITY AND BUSINESS

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met:		12
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
MECN 6200	Global Competition and Market Dominance	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	
STRT 6224	Managing the Sustainable Global Enterprise	

CONCENTRATION IN MBA X ARTIFICIAL INTELLIGENCE

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 5170	Artificial Intelligence for Human-Computer Interaction	4
CS 6140	Machine Learning	4

CONCENTRATION IN MBA X BIOINFORMATICS

Code	Title	Hours
BINF 6200	Bioinformatics Programming	4
BINF 6310	Introduction to Bioinformatics	4
BINF 6400	Genomics in Bioinformatics	4

CONCENTRATION IN MBA X CYBERSECURITY

Code	Title	Hours
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	4
CY 5250	Decision Making for Critical Infrastructure	4
CY 6760	Wireless and Mobile Systems Security	4

CONCENTRATION IN MBA X DATA SCIENCE

Code	Title	Hours
DS 5110	Essentials of Data Science	4
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4

CONCENTRATION IN MBA X DATA VISUALIZATION

Code	Title	Hours
Required		
ARTG 5150	Information Visualization Principles and Practices	3
ARTG 5151	Information Design Critique Seminar	1
ARTG 5330	Visualization Technologies 1: Fundamentals	4
Elective		
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met:		4
ARTG 5310	Visual Cognition	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN MBA X EXPERIENCE DESIGN

Code	Title	Hours
Required		
ARTG 5610	Design Systems	4
ARTG 6310	Design for Behavior and Experience	4
Elective		
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met:		4
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	

CONCENTRATION IN MBA X EXTENDED REALITIES

Code	Title	Hours
Required		
EXRE 5010	Immersive Media: Extended Realities (XR) History, Theory, and Impact	4
Elective		
In consultation with advisor, complete 8 graduate-level semester hours for which prerequisites have been met:		8
EXRE 5020	Developing Extended Realities (XR)	
EXRE 5030	Designing Extended Realities (XR)	
EXRE 5973	Topics in Extended Realities (XR)	
GSND 6520	3D Modeling and Asset Creation Principles	

CONCENTRATION IN MBA X GAME DESIGN

Code	Title	Hours
Required		
GSND 5110	Game Design and Analysis	4
Elective		
In consultation with advisor, complete 8 graduate-level semester hours for which prerequisites have been met:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6460	Generative Game Design	

CONCENTRATION IN MBA X GAME SCIENCE

Code	Title	Hours
Required		
GSND 5110	Game Design and Analysis	4
Elective		
In consultation with advisor, complete 8 graduate-level semester hours for which prerequisites have been met:		8
GSND 6001	Advanced Topics in Game Science	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	

CONCENTRATION IN MBA X INFORMATION ETHICS

Code	Title	Hours
Required		
In consultation with advisor, complete 8 graduate-level semester hours for which prerequisites have been met:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met:		4
PHIL 5001	Global Justice	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MBA X MEDIA INNOVATION AND ADVOCACY

Code	Title	Hours
Required		
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4
Elective		
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics	
JRNL 6341	Telling Your Story with Data	

CONCENTRATION IN MBA X PUBLIC HEALTH

Code	Title	Hours
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 6208	Foundations of Community Health Assessment	3

CONCENTRATION IN MBA X SOFTWARE DEVELOPMENT

Code	Title	Hours
CS 5500	Foundations of Software Engineering	4
CS 5520	Mobile Application Development	4
CS 5610	Web Development	4

Business Administration, MBA—Online

Northeastern University's D'Amore-McKim School of Business prepares business leaders to navigate the challenges of today's tech-forward business world. D'Amore-McKim's Online MBA (https://damore-mckim.northeastern.edu/programs/online-mba/?utm_medium=website&utm_source=catalog&utm_campaign=omba) program helps students build broad business skill sets and specialized knowledge in their field. In this flexible program, students build skills that they can apply in real-time—and complete their degree 100% online in as little as 18 months.

Integrate Classroom and Professional Experiences

Learning by doing is a hallmark of a Northeastern University MBA. Students apply their knowledge to actual business challenges through experience-fueled electives and class projects. Students gain unique perspectives as they learn from entrepreneurs and executives at top firms who have led through times of rapid change.

Live Faculty Connect Sessions

Optional live faculty sessions offer a collaborative and interactive learning environment where students can connect with their professors and peers weekly to discuss course concepts, receive feedback, and gain valuable insights.

EXPO Courses

In the EEBA 6401 Experiential Business Decision Making course, students take on the role of a C-suite business executive and tackle a real business challenge for an actual company, all while gaining real-time feedback from a seasoned C-suite executive.

Societal Challenge Courses

In the societal challenge courses, students build upon the skills gained in the core course focusing on stakeholder values and societal challenges by selecting either a diversity, equity, and inclusion course or a sustainability course. The skills gained through these courses are designed to prepare students for immediate impact and are exactly what employers are seeking.

In the EEBA 6403 EXPO Challenge: Diversity, Equity, and Inclusion course, students work as a team to solve a DEI-related business problem. The course format includes case studies, Q&A sessions, and guidance and feedback from industry experts and seasoned faculty members.

In the EEBA 6402 EXPO Challenge: Sustainability course, students work in teams to bring their experience and newly learned skills to solve a real sustainability-related business problem. These problems could range from environmental sustainability issues to societal challenges associated with climate change. The course format includes case studies, Q&A sessions, and guidance and feedback from industry experts and seasoned faculty members.

Program Requirements

Business Core Requirements

Code	Title	Hours
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	2
EEBA 6401	Experiential Business Decision Making	3
FINA 6318	Financial Management	2
HRMG 6318	Managing the Organization	2
INNO 6318	Innovation Driven Strategy	2
MKTG 6318	Customer Value and the Enterprise	2
SCHM 6318	Managing Operations and the Supply Chain	2
STRT 6318	Strategic Planning for the Future	2

Societal Challenges Core

Code	Title	Hours
BUSN 6402	Stakeholder Values and Societal Challenges in Business	2
In consultation with advisor, complete one of the following:		2
EEBA 6402	EXPO Challenge: Sustainability	
EEBA 6403	EXPO Challenge: Diversity, Equity, and Inclusion	

Business Electives

Code	Title	Hours
In consultation with advisor, complete 24 graduate-level semester hours for which prerequisites have been met. Choose from the following subject codes:		24
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE		
In consultation with advisor, complete 5 semester hours of experiential elective coursework.		5
EEBA 6401	Experiential Business Decision Making	

Program Credit/GPA Requirements

50 total semester hours required

Minimum 3.000 GPA required

Business Administration, MBA—Part-Time (Boston)

Northeastern University's D'Amore-McKim School of Business is designed to prepare business leaders to navigate the challenges of today's tech-forward business world. D'Amore-McKim's Part-Time MBA (https://damore-mckim.northeastern.edu/programs/part-time-mba/?utm_medium=website&utm_source=catalog&utm_campaign=part-time-mba) program helps students build broad business skill sets and specialized knowledge in their field. In this flexible program, students build skills they can apply in real time—and complete their degree part-time.

Integrate Classroom and Professional Experiences

Learning by doing is a hallmark of a Northeastern MBA. Students apply their knowledge to actual business challenges through experience-fueled electives and class projects. Students gain unique perspectives as they learn from entrepreneurs and executives at top firms who have led through times of rapid change.

Select Up to Two Concentrations

Students may specialize their degree by selecting up to two in-demand business concentrations. Students gain exposure to diverse perspectives as they build competencies in multiple disciplines. This combination prepares them to lead in a complex business world.

Program Requirements

Core Requirements

Code	Title	Hours
Accounting		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	2
Management		
HRMG 6318	Managing the Organization	2
SCHM 6318	Managing Operations and the Supply Chain	2
STRT 6318	Strategic Planning for the Future	2
Marketing		

MKTG 6318	Customer Value and the Enterprise	2
Finance		
FINA 6318	Financial Management	2
Entrepreneurship		
INNO 6318	Innovation Driven Strategy	2

Optional Concentration

Students may complete up to two of the following concentrations. Courses taken to fulfill concentrations may be used toward the elective section below.

- Analytics (p. 299)
- Brand Management (p. 300)
- Business Management for Healthcare (p. 300)
- Corporate Finance (p. 300)
- Corporate Innovation (p. 301)
- Corporate Renewal (p. 301)
- Entrepreneurship (p. 301)
- International Business (p. 301)
- Investments (p. 302)
- Leading People and Organizations (p. 302)
- Marketing (p. 302)
- Marketing Analytics (p. 302)
- Mutual Fund Management (p. 303)
- Operation and Supply Chain Management (p. 303)
- Sustainability and Business (p. 303)

Electives

Code	Title	Hours
In consultation with advisor, complete 36 graduate-level semester hours for which prerequisites have been met. Choose from the following subject codes:		36
ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MISM, MKTG, SCHM, and STRT		
No more than 4 semester hours can be drawn from 1-semester-hour courses.		

Program Credit/GPA Requirements

50 semester hours required
Minimum 3.000 GPA required

CONCENTRATION IN ANALYTICS

Code	Title	Hours
Required		
MISM 6200	Introduction to Business Analytics	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
MISM 6201	Database Management for Business	
MISM 6202	Foundations of Data Analysis for Business	
MISM 6205	Data Wrangling for Business	
MISM 6206	Modeling for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	

CONCENTRATION IN BRAND MANAGEMENT

Code	Title	Hours
Required		
MKTG 6223	Brand and Advertising Management	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6287	Succeeding in the Platform Economy	

CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE

Code	Title	Hours
Required		
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3
Elective		
In consultation with advisor, complete 3 graduate-level semester hours from the following for which prerequisites have been met:		3
ENTR 6214	Social Enterprise	
FINA 6220	Healthcare Finance	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
MGMT 6214	Negotiations	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	

CONCENTRATION IN CORPORATE FINANCE

Code	Title	Hours
Required		
FINA 6205	Financial Strategy	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
FINA 6204	International Financial Management	
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6342	Financial Data and Fintech	

CONCENTRATION IN CORPORATE INNOVATION

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
ARTG 5610	Design Systems	
GE 5100	Product Development for Engineers	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
HRMG 6280	The Human Side of Innovation	
INNO 6217	Lean Innovation	
INNO 6222	Competing in Dynamic, Innovation-Driven Markets	
INNO 6225	Acquisitions, Alliances, and Growth	
INNO 6227	Digital Bias in Business	
INNO 6230	Platform Innovation	

CONCENTRATION IN CORPORATE RENEWAL

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
ENTR 6214	Social Enterprise	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
HRMG 6218	Great Companies	
HRMG 6223	Global Talent Management	
MGMT 6214	Negotiations	
MKTG 6216	Market Focused Strategy	

CONCENTRATION IN ENTREPRENEURSHIP

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
ENTR 6340	The Technical Entrepreneur as Leader	
GE 5030	Iterative Product Prototyping for Engineers	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

CONCENTRATION IN INTERNATIONAL BUSINESS

Code	Title	Hours
Required		
INTB 6212	Cultural Aspects of International Business	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
FINA 6204	International Financial Management	
INNO 6225	Acquisitions, Alliances, and Growth	
INTB 6226	Becoming a Global Leader	
INTB 6230	Global Field Study	
INTB 6249	Digitization of International Business	

MKTG 6212	International Marketing
SCHM 6213	Global Supply Chain Strategy
STRT 6224	Managing the Sustainable Global Enterprise

CONCENTRATION IN INVESTMENTS

Code	Title	Hours
Required		
FINA 6203	Investment Analysis	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6339	Quantitative Portfolio Management	
FINA 6342	Financial Data and Fintech	

CONCENTRATION IN LEADING PEOPLE AND ORGANIZATIONS

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
HRMG 6218	Great Companies	
HRMG 6221	Power and Influence	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
HRMG 6223	Global Talent Management	
INTB 6226	Becoming a Global Leader	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	
STRT 6224	Managing the Sustainable Global Enterprise	

CONCENTRATION IN MARKETING

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
MKTG 6287	Succeeding in the Platform Economy	

CONCENTRATION IN MARKETING ANALYTICS

Code	Title	Hours
Required		
MKTG 6234	Marketing Analytics	3
Electives		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	

MKTG 6222

Digital Marketing

MKTG 6230

Driving Marketing Performance: Measure, Analyze, Profit

CONCENTRATION IN MUTUAL FUND MANAGEMENT

Code	Title	Hours
Required		
FINA 6203	Investment Analysis	3
Electives		
In consultation with advisor, complete 9 graduate-level semester hours of FINA courses for which prerequisites have been met. Students may complete 3 semester hours through our student-managed mutual fund. Each course is 1 semester hour and may be taken multiple times. At least 1 semester hour must be as a fund manager (FINA 6361).		9
FINA 6360	Fund Management for Analysts	
or FINA 6361	Fund Management for Managers	

CONCENTRATION IN OPERATION AND SUPPLY CHAIN MANAGEMENT

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
SCHM 6211	Logistics and Transportation Management	
SCHM 6213	Global Supply Chain Strategy	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

CONCENTRATION IN SUSTAINABILITY AND BUSINESS

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	
STRT 6224	Managing the Sustainable Global Enterprise	

Dual Degrees

Northeastern University's D'Amore-McKim School of Business is designed to prepare learners to be responsible business leaders of the world capable of working, navigating, and creating in a digital environment. Our dual degree programs (<https://damore-mckim.northeastern.edu/catalog-dual-degrees/>) offer a powerful opportunity for students to build their future-forward business skills through an MBA and a deep foundation in another area. Dual degree students earn two degrees simultaneously—an MBA and a second degree from Northeastern.

At Northeastern, experience is at the heart of everything we do. Our experience-powered educational model fuses robust classroom education with real-world application. Students benefit from opportunities to apply what they've learned in the classroom to real challenges in business and the industry of their second degree.

Dual degree programs merge select core requirements from a D'Amore-McKim MBA with a master's degree or juris doctorate, allowing students to finish their program in less time than it would take to earn the two degrees separately. This distinctive blend of knowledge and skill positions dual degree students to lead in the two sectors.

Programs

- Business Administration, MBA—Full-Time / Finance, MSF (Boston) (p. 304)
- Business Administration, MBA—Part-Time / Finance, MSF (Boston) (p. 304)
- Law, JD / Accounting and Business Administration, MSAMBA (Boston) (p. 305)
- Law, JD / Business Administration, MBA—Full-Time (Boston) (p. 305)

- Law, LLM / Business Administration, MBA—Full-Time (Boston) (p. 305)
- Quantitative Finance, MSF / Business Administration, MBA—Full-Time (Boston) (p. 306)

Business Administration, MBA—Full-Time / Finance, MSF (Boston)

Northeastern University's D'Amore-McKim School of Business prepares resilient finance leaders to weather a changing business world. The Full-Time MBA / MSF Finance (https://damore-mckim.northeastern.edu/programs/full-time-ms-finance-mba/?utm_source=internal-referral&utm_medium=nucatalog&utm_campaign=ftmsfmba) dual degree program integrates business knowledge with a deep understanding of finance to prepare students to be the leaders that today's business world demands.

Develop Deep Finance Expertise

Students pursue rigorous coursework laser focused on financial theory and practice. Students have an opportunity to gain advanced financial skills and high-level knowledge to drive financial strategy, increase shareholder value, support flexible operating models, minimize risk, and maximize revenue through the finance courses.

Select a Concentration

Students specialize their MBA degree by selecting a concentration in either corporate finance or investments. In the corporate finance concentration, students master a range of financial, analytical, and communication skills for increasing profitability and shareholder value. In the investments concentration, students become knowledgeable managers of assets for individuals or institutions, building their expertise in capital allocation, valuation, or risk management.

Integrating Classroom and Professional Experiences

Learning by doing is a hallmark of a Northeastern MBA. Students apply their knowledge to actual business challenges through experience-powered electives and class projects. Through a corporate residency, students gain invaluable experience at the intersection of business and finance, translating ideas into action for three, six, or up to 12 months. Far removed from the typical internship, students work full time at a leading firm or startup in their field and have significant responsibilities as they work to deliver on organizational goals.

Students can apply to gain valuable experience performing equity research and portfolio management in a student-managed mutual fund, The 360 Huntington Fund. By participating in the Fund, students may earn 1 semester hour per semester with the option to fulfill a 3-semester-hour elective course requirement by participating for three terms.

Through coursework or individually, students can earn Bloomberg Market Concepts and the Bloomberg Environmental, Social, & Governance certifications and gain a deeper understanding of how businesses operate in the global economy—and how they implement strategies to become better corporate citizens.

Business Administration, MBA—Part-Time / Finance, MSF (Boston)

Northeastern University's D'Amore-McKim School of Business is designed to prepare resilient finance leaders to weather a changing business world. The Part-Time MS in Finance/MBA (<https://damore-mckim.northeastern.edu/programs/part-time-ms-finance-mba/>) dual degree program integrates business knowledge with a deep understanding of finance to prepare students to be the leaders that today's business world demands.

Develop Deep Finance Expertise

Students pursue rigorous coursework laser focused on financial theory and practice. Students have an opportunity to gain advanced financial skills and high-level knowledge to drive financial strategy, increase shareholder value, support flexible operating models, minimize risk, and maximize revenue through the finance courses.

Select a Concentration

Students specialize their MBA degree by selecting a concentration in either corporate finance or investments. In the corporate finance concentration, students have an opportunity to master a range of financial, analytical, and communication skills for increasing profitability and shareholder value. In the investments concentration, students may become knowledgeable managers of assets for individuals or institutions, building their expertise in capital allocation, valuation, or risk management.

Integrating Classroom and Professional Experiences

Learning by doing is a hallmark of a Northeastern MBA. Students apply their knowledge to actual business challenges through experience-powered electives and class projects. Through a corporate residency, students gain invaluable experience at the intersection of business and finance, translating ideas into action for three, six, or up to 12 months. Far removed from the typical internship, students work full time at a leading firm or startup in their field and have significant responsibilities as they work to deliver on organizational goals.

Students can apply to gain valuable experience performing equity research and portfolio management in a student-managed mutual fund, The 360 Huntington Fund. By participating in the Fund, students may earn 1 semester hour per semester with the option to fulfill a 3-semester-hour elective course requirement by participating for three terms.

Through coursework or individually, students can earn Bloomberg Market Concepts and the Bloomberg Environmental Social Governance certifications and gain a deeper understanding of how businesses operate in the global economy—and how they implement strategies to become better corporate citizens.

Law, JD / Accounting and Business Administration, MSAMBA (Boston)

The Northeastern University School of Law and the D'Amore-McKim School of Business offer a combined degree that results in a Juris Doctor and Master of Science in Accounting and Business Administration. Students without a previous accounting background study how to operate effectively in specialized fields such as taxation law, corporate finance, or mergers and acquisitions. Students have an opportunity to gain advanced legal expertise alongside future-forward accounting and business knowledge.

Our combined degree program is a full-time, four-year course of study. Students usually complete two years of the law curriculum, followed by 15 months of the combined accounting and business administration curriculum, before returning to finish their studies at the School of Law.

Students gain valuable work experience in law and public accounting before they graduate. They can make a real impact during two co-ops in legal departments, law firms, government agencies, judges' chambers, or other legal settings. Students also experience working as an accounting associate during the busy tax season through a corporate residency at Big 4 or other globally known accounting firms.

Students concurrently pursue the two degrees and may count 12 semester hours of nonlaw coursework from the accounting and business administration curriculum toward the law curriculum. The corporate residency at an accounting firm may fulfill the requirement for the third co-op required for the law curriculum. Students are encouraged to consult their law advisor to select accounting and business classes that satisfy JD requirements.

Law, JD / Business Administration, MBA—Full-Time (Boston)

The JD/MBA dual degree is offered through a partnership between Northeastern University School of Law and the D'Amore-McKim School of Business to position students to operate in increasingly interdependent legal and business spheres. As new technology disrupts industries and data availability and sophisticated use shifts the business landscape, our JD/MBA (<https://damore-mckim.northeastern.edu/programs/jd-mba/>) students prepare to guide corporate-level strategy and become the leaders businesses need.

Our JD/MBA program is a full-time, four-year course of study that includes three semester-long co-op work experiences arranged through Northeastern Law. Students complete three years of law school, taking a break after either year one or two to complete a year of business courses.

Students specialize their program by selecting two in-demand business concentrations from the D'Amore-McKim School of Business. Or, they may add expertise in another professional area by selecting an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

Students concurrently pursue the two degrees and may count 9 semester hours of nonlaw coursework from the JD curriculum toward the interdisciplinary and elective requirements of the MBA degree and up to 12 semester hours from the MBA curriculum toward the JD degree. Students should work with their MBA advisor to select JD courses that will fulfill MBA requirements and with their law advisor to choose MBA courses that will satisfy JD requirements.

Law, LLM / Business Administration, MBA—Full-Time (Boston)

Law, LLM / MBA

The LLM/MBA dual degree is offered through a partnership between Northeastern University School of Law and the D'Amore-McKim School of Business to position students to harness legal and business skills to serve their clients' needs. In the LLM/MBA (<https://damore-mckim.northeastern.edu/programs/llm-mba/>) program, students prepare to assume leadership positions where they'll navigate complex legal issues, answer their clients' calls for legal expertise, and engage as partners to develop new models for businesses, nonprofit organizations, and governments worldwide.

The LLM/MBA program is a full-time, 20-month course of study. Students start taking classes in business school, take law courses next, and finish with business courses.

Students specialize their program by selecting two in-demand business concentrations from the D'Amore-McKim School of Business. Or, they could add expertise in another professional area by choosing an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

Students concurrently pursue the two degrees and may be able to count up to 12 semester hours of coursework toward both degrees. Students should consult their MBA and LLM program advisors for more information.

Law, LLM—Experiential / MBA

The LLM/MBA dual degree is offered through a partnership between Northeastern Law and the D'Amore-McKim School of Business to position students to harness business and legal skills to serve their clients' needs. In the LLM/MBA (<https://damore-mckim.northeastern.edu/programs/llm->

mba/) program, students prepare to assume leadership positions where they'll navigate complex legal issues, answer their clients' calls for legal expertise, and engage as partners to develop new models for businesses, nonprofit organizations, and governments worldwide.

The LLM/MBA program is a full-time, two-year course of study that includes a semester-long co-op work experience arranged through Northeastern Law. During the course of their studies, students take classes in business school and the School of Law and complete a law co-op.

Students specialize their degree by selecting two in-demand business concentrations from the D'Amore-McKim School of Business. Or, they could add expertise in another professional area by selecting an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

Students will concurrently pursue the two degrees and may be able to count up to 12 semester hours of coursework toward both degrees. Students should consult their MBA and LLM program advisors for more information.

Quantitative Finance, MSF / Business Administration, MBA—Full Time (Boston)

Northeastern University's D'Amore-McKim School of Business is designed to position students to become leaders ready for the rapidly changing financial services industry. The MSF Quantitative Finance/MBA (https://damore-mckim.northeastern.edu/programs/full-time-ms-finance-mba/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=ftmsfmba) dual degree integrates business knowledge with advanced mathematical and technical skills.

Integrating Classroom and Professional Experiences

Learning by doing is a hallmark of a Northeastern MBA. Students apply their knowledge to actual business challenges through experience-fueled electives and class projects. Students gain invaluable experience at the intersection of business and finance through a corporate residency, translating ideas into action for three, six, or up to 12 months. Far removed from the typical internship, students work full time at a leading firm or startup in their field and have significant responsibilities as they work to deliver on organizational goals.

Cultivate Advanced Quantitative Finance Skills

Students pursue a major in quantitative finance that emphasizes the intersection of technology and business analytics with finance. Coursework integrates economics, mathematics, and computer science with financial theory and application. Students have an opportunity to develop mathematically demanding quantitative skills and fintech expertise.

The 360 Huntington Fund

By participating in the Fund, students may earn 1 semester hour per semester with the option to fulfill a 3-semester-hour elective course requirement by participating for three terms.

Concentrate in Analytics

Students specialize their MBA degree by concentrating in analytics.

Graduate Certificates

Northeastern University's D'Amore-McKim School of Business offers graduate certificates (<https://damore-mckim.northeastern.edu/graduate-certificates/>) to help professionals quickly develop knowledge through short-term programs focused on a specific business area. Students may choose to fill in gaps in their business knowledge or strengthen their skills in market-aligned areas to expand their career potential.

Our business faculty, many of whom are also consultants, respected management leaders, and startup founders, share their insights. Additionally, students will have classmates from a multitude of industries who share their passions and interests, enriching the learning experience.

Programs

- Accounting and Financial Decision Making, Graduate Certificate (Boston) (p. 307)
- AI Applications, Graduate Certificate (Boston) (p. 190)
- Brand Management, Graduate Certificate (Boston) (p. 308)
- Business Administration, Graduate Certificate (Boston) (p. 309)
- Business Administration, Graduate Certificate (Miami) (p. 310)
- Business Administration, Graduate Certificate—Online (p. 311)
- Business Analytics, Graduate Certificate (Boston) (p. 312)
- Business Management for Healthcare, Graduate Certificate (Boston) (p. 312)
- Corporate Finance, Graduate Certificate (Boston) (p. 313)
- Corporate Innovation, Graduate Certificate (Boston) (p. 313)
- Corporate Renewal, Graduate Certificate (Boston) (p. 314)
- Entrepreneurship, Graduate Certificate (Boston) (p. 315)
- International Business, Graduate Certificate (Boston) (p. 315)

- Investments, Graduate Certificate (Boston) (p. 316)
- Leading People and Organizations, Graduate Certificate (Boston) (p. 316)
- Marketing, Graduate Certificate (Boston) (p. 317)
- Marketing Analytics, Graduate Certificate (Boston) (p. 318)
- Mutual Fund Management, Graduate Certificate (Boston) (p. 318)
- Product Management, Graduate Certificate (Boston) (p. 192)
- Supply Chain Management, Graduate Certificate (Boston) (p. 320)
- Sustainability and Business, Graduate Certificate (Boston) (p. 321)

Accounting and Financial Decision Making, Graduate Certificate, (Boston)

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Accounting and Financial Decision Making (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/accounting/?utm_medium=website&utm_source=catalog&utm_campaign=gcafdm) helps students build critical skills for essential financial practices, positioning them for a managerial role. Students learn to see business problems clearly, identify the strategic implications of potential solutions, and develop innovative ways to achieve organizational goals.

In just five courses—with the option to take a sixth to deepen their learning—students will advance their understanding of critical financial practices and build the skills necessary to analyze financial statements, assess risk, and make informed decisions. Depending on the electives they choose, they'll explore critical topics in greater depth, such as resource acquisition, capital budgeting, and information technology.

Students may enroll in the Graduate Certificate in Accounting and Financial Decision Making for full-time or part-time study.

Program Requirements

Core Requirements

Code	Title	Hours
ACCT 6200 and ACCT 6201	Financial Reporting and Managerial Decision Making 1 and Financial Reporting and Managerial Decision Making 2	4.5
FINA 6200	Value Creation through Financial Decision Making	3
MGSC 6200	Information Analysis	3

Elective

Code	Title	Hours
In consultation with advisor, complete one graduate-level course for which prerequisites have been met. Some courses may fulfill requirements of the MBA program.		1.5-3
HRMG 6200	Managing People and Organizations	
INNO 6200	Enterprise Growth and Innovation	
INTB 6200	Managing the Global Enterprise	
MECN 6200	Global Competition and Market Dominance	
MGSC 6204	Managing Information Resources	
MKTG 6200	Creating and Sustaining Customer Markets	
STRT 6200	Strategic Decision Making in a Changing Environment	

Program Credit/GPA Requirements

12 total semester hours required; may complete a maximum of 15 semester hours

Minimum 3.000 GPA required

AI Applications, Graduate Certificate (Boston)

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- College of Social Sciences and Humanities
- D'Amore-McKim School of Business
- Mills College at Northeastern

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

Experiential Courses

Code	Title	Hours
Complete 4 semester hours from the following:		4
CRIM 6600	Justice, Technology, and AI	
EDUT 6150	AI in Education	
HLTH 5800	AI Across the Health Sciences	
IE 5640	Data Mining for Engineering Applications	
JRNL 6460	AI in Media Industries	
MISM 6250	Strategic AI for Business	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Brand Management, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Brand Management (https://damore-mckim.northeastern.edu/programs/brand-management-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=GCBM) helps students create and manage brands that resonate with consumers. Students develop a strategic mindset and specialized skills equipped for today's dynamic digital marketing environment.

In just four courses—with an option to take a fifth to deepen your learning—you'll learn how to develop an integrated brand strategy that helps students position an organization for growth. Your coursework will explore the brand-building process across platforms, and you'll choose electives that take a deeper look at topics such as consumer behavior, marketing research, and innovation.

Program Requirements

Core Requirements

Code	Title	Hours
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	3

Electives

Code	Title	Hours
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		6
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

Business Administration, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in Business Administration (https://damore-mckim.northeastern.edu/programs/business-administration-certificate/?utm_medium=content&utm_source=catalog&utm_campaign=dmsb-melt-evg-glo-comp-bos-bus-gcbaa-con-2022_02_25-gcba_catalog) helps students gain forward-thinking, relevant, in-demand business skills.

There are three ways to earn this graduate certificate:

Build Your Own

Students align their courses to their professional goals by choosing one area of focus or widening their scope and building expertise on all business fundamentals as they build their curriculum (<https://damore-mckim.northeastern.edu/programs/business-administration-certificate/academic-details/build-your-own-curriculum/>). Students can select any graduate-level business courses offered that semester, provided they meet course prerequisites. Course offerings vary by term and campus.

Eight-month International Student Cohort Curriculum

Students take five courses as a part of an international student cohort (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/academics/international-cohort/?utm_medium=website&utm_source=catalog&utm_campaign=gcba). Students expand their business knowledge in financial reporting, managerial decision-making, information analysis, and managing information resources.

Part-Time MBA Path Curriculum

Students take six foundational quantitative and business classes from the D'Amore-McKim MBA curriculum in the Part-Time MBA Path (<https://damore-mckim.northeastern.edu/programs/business-administration-certificate/academic-details/part-time-mba-path-curriculum/>).

Program Requirements

Part-Time MBA Path Curriculum

Code	Title	Hours
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
ACCT 6201	Financial Reporting and Managerial Decision Making 2	1.5
FINA 6200	Value Creation through Financial Decision Making	3
HRMG 6200	Managing People and Organizations	3
MGSC 6200	Information Analysis	3
MGSC 6204	Managing Information Resources	1.5

Eight-Month International Student Cohort Curriculum

Code	Title	Hours
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
HRMG 6200	Managing People and Organizations	3
INNO 6200	Enterprise Growth and Innovation	3
INTB 6200	Managing the Global Enterprise	3
MKTG 6200	Creating and Sustaining Customer Markets	3

Build-Your-Own Curriculum

Code	Title	Hours

In consultation with advisor, complete 12–15 graduate-level semester hours for which prerequisites have been met. Choose from the following subject codes:

ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE

Accelerated Four-Month Curriculum

Code	Title	Hours

In consultation with advisor, complete 12–15 graduate-level semester hours for which prerequisites have been met. Choose from the following subject codes:

ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Business Administration, Graduate Certificate (Miami)

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in Business Administration (https://damore-mckim.northeastern.edu/programs/business-administration-certificate/?utm_medium=content&utm_source=catalog&utm_campaign=dmsb-melt-evg-glo-comp-bos-bus-gcbaa-con-2022_02_25-gcba_catalog) helps students gain forward-thinking, relevant, in-demand business skills.

There are three ways to earn this graduate certificate:

Build Your Own

Students align their courses to their professional goals by choosing one area of focus or widening their scope and building expertise on all business fundamentals as they build their curriculum (<https://damore-mckim.northeastern.edu/programs/business-administration-certificate/academic-details/build-your-own-curriculum/>). Students can select any graduate-level business courses offered that semester, provided they meet course prerequisites. Course offerings vary by term and campus.

Eight-month International Student Cohort Curriculum

Students take five courses as a part of an international student cohort (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/academics/international-cohort/?utm_medium=website&utm_source=catalog&utm_campaign=gcba). Students expand their business knowledge in financial reporting, managerial decision-making, information analysis, and managing information resources.

Part-Time MBA Path Curriculum

Students take six foundational quantitative and business classes from the D'Amore-McKim MBA curriculum in the Part-Time MBA Path (<https://damore-mckim.northeastern.edu/programs/business-administration-certificate/academic-details/part-time-mba-path-curriculum/>).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Part-Time MBA Path Curriculum

Code	Title	Hours
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
ACCT 6201	Financial Reporting and Managerial Decision Making 2	1.5
FINA 6200	Value Creation through Financial Decision Making	3
HRMG 6200	Managing People and Organizations	3
MGSC 6200	Information Analysis	3
MGSC 6204	Managing Information Resources	1.5

Eight-Month International Student Cohort Curriculum

Code	Title	Hours
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
HRMG 6200	Managing People and Organizations	3
INNO 6200	Enterprise Growth and Innovation	3
INTB 6200	Managing the Global Enterprise	3
MKTG 6200	Creating and Sustaining Customer Markets	3

Build-Your-Own Curriculum

Code	Title	Hours

In consultation with advisor, complete 12–15 graduate-level semester hours for which prerequisites have been met. Choose from the following subject codes:

ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE

Accelerated Four-Month Curriculum

Code	Title	Hours

In consultation with advisor, complete 12–15 graduate-level semester hours for which prerequisites have been met. Choose from the following subject codes:

ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Business Administration, Graduate Certificate—Online

Northeastern University D'Amore-McKim School of Business' Online Graduate Certificate in Business Administration

([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/?](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/?utm_medium=website&utm_source=catalog&utm_campaign=gcba)

[utm_medium=website&utm_source=catalog&utm_campaign=gcba](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/?utm_medium=website&utm_source=catalog&utm_campaign=gcba)) helps students gain forward-thinking, in-demand business skills. Students can align their interests with their goals by choosing one area of focus, or they may choose to widen their scope and build expertise on all business fundamentals.

Students select four classes from finance, marketing, sustainability, entrepreneurship, investments, management, healthcare, or supply chain management.

Program Requirements

Core Requirements

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6211	Entrepreneurship: Services and Retail Business Creation	
ENTR 6212	Business Planning for New Ventures	
ENTR 6216	Global Social Entrepreneurship and Innovation	
FINA 6200	Value Creation through Financial Decision Making	
FINA 6203	Investment Analysis	
FINA 6204	International Financial Management	
FINA 6205	Financial Strategy	
FINA 6211	Financial Risk Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
HRMG 6200	Managing People and Organizations	
HRMG 6217	Virtual, Vicious Teams: Building and Leading High-Performance Teams	
INNO 6200	Enterprise Growth and Innovation	
INTB 6200	Managing the Global Enterprise	
INTB 6212	Cultural Aspects of International Business	
MECN 6200	Global Competition and Market Dominance	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6222	Healthcare Industry	
MGMT 6223	Strategic Decision Making for Healthcare Professionals	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
MGSC 6200	Information Analysis	
MGSC 6204	Managing Information Resources	
MGSC 6221	Introduction to Health Informatics and Health Information Systems	
MKTG 6200	Creating and Sustaining Customer Markets	
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6223	Brand and Advertising Management	
SCHM 6201	Operations and Supply Chain Management	
SCHM 6211	Logistics and Transportation Management	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	

SCHM 6214	Sourcing and Procurement
SCHM 6221	Sustainability and Supply Chain Management

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Business Analytics, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in Business Analytics (https://damore-mckim.northeastern.edu/programs/business-analytics-certificate/?utm_medium=content&utm_source=catalog&utm_campaign=dmsb-melt-evg-glo-comp-bos-bus-gcba-con-2022_02_25-gcbanalytics_catalog) is designed to equip students to use data to analyze information, generate insights, and translate them into sound strategy. Students build expertise in up-to-the-moment methods for using analytics in business.

In just four courses—with the option to take a fifth to deepen their knowledge base—students view the business world through a data-centric lens. Depending on the courses they choose, students can explore topics such as advanced data mining techniques, visual dashboards, artificial intelligence, and programming languages.

Program Requirements

Core Requirements

Code	Title	Hours
MISM 6200	Introduction to Business Analytics	3

Electives

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		9
MISM 6202	Foundations of Data Analysis for Business	
MISM 6205	Data Wrangling for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
SCHM 6215	Supply Chain Analytics	

Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

Business Management for Healthcare, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Business Management for Healthcare (https://damore-mckim.northeastern.edu/programs/business-management-healthcare-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gcbmh) helps students gain critical business knowledge, up-to-the-moment technical skills, and a core understanding of key healthcare issues.

In just four courses—with an option to take a fifth to deepen their learning—students study the fundamentals of the American healthcare system and identify its unique challenges and opportunities. Depending on the electives they choose, students can take a deeper look at health policy, health informatics, and supply chain management for healthcare.

Program Requirements

Core Requirements

Code	Title	Hours
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3

Electives

Code	Title	Hours
In consultation with advisor, complete 3 graduate-level semester hours from the following for which prerequisites have been met:		3
HINF 5101	Introduction to Health Informatics and Health Information Systems	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Corporate Finance, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in Corporate Finance (https://damore-mckim.northeastern.edu/programs/corporate-finance-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gccf) helps students advance their finance careers by building cutting-edge business planning, financial analysis, and investment management skill sets.

In just four courses—with the option to take a fifth course to further their learning—students have an opportunity to develop a deeper understanding of domestic and international markets, building a rich context for effective financial decision making. Depending on their chosen electives, students can explore critical topics in greater depth such as investment banking, mergers and acquisitions, and business turnarounds.

Program Requirements

Core Requirement

Code	Title	Hours
FINA 6205	Financial Strategy	3

Electives

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met (some courses may also apply to requirements of the MBA program):		9
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
FINA 6204	International Financial Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
HRMG 6200	Managing People and Organizations	
INTB 6200	Managing the Global Enterprise	
MECN 6200	Global Competition and Market Dominance	
MKTG 6200	Creating and Sustaining Customer Markets	
STRT 6200	Strategic Decision Making in a Changing Environment	

Program Credit/GPA Requirements

12 semester hours required; may complete a maximum of 15 semester hours

Minimum 3.000 GPA required

Corporate Innovation, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Corporate Innovation (https://damore-mckim.northeastern.edu/programs/corporate-innovation-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gcci) prepares students with an agile, curious mindset and expertise in proven innovation practices.

In just four courses—with the option to take a fifth course to deepen their knowledge—students learn essential innovation tools for improving processes, products, and services, emphasizing driving growth through innovation. Depending on the electives chosen, students explore critical topics in greater depth, such as social enterprise, business model design, or corporate entrepreneurship.

Program Requirements**Core Requirement**

Code	Title	Hours
INNO 6200	Enterprise Growth and Innovation	3

Electives

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9

ENTR 6212	Business Planning for New Ventures
ENTR 6300	Managing a Technology-Based Business
ENTR 6340	The Technical Entrepreneur as Leader
GE 5100	Product Development for Engineers
INNO 6217	Lean Innovation
INNO 6222	Competing in Dynamic, Innovation-Driven Markets
INNO 6225	Acquisitions, Alliances, and Growth
HRMG 6280	The Human Side of Innovation
MKTG 6214	New Product Development

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Corporate Renewal, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in Corporate Renewal (https://damore-mckim.northeastern.edu/programs/corporate-renewal-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gccr) is designed to prepare students with the skills and knowledge to reinvent troubled companies. Students develop an agile and strategic mindset—and a portfolio of skills from multiple disciplines.

In just four courses—with the option to take a fifth course to expand their learning—students have an opportunity to develop a deeper understanding of the management and financial issues companies face when they're in crisis and to build skills to facilitate the process of reinvention and restructuring. They study the essentials of guiding companies through workouts, bankruptcies, liquidations, and restructuring—and help them find success on the other side. Depending on their chosen electives, students explore critical topics in greater depth, such as strategic planning, innovation, and negotiation.

Program Requirements**Core Requirements**

Code	Title	Hours
FINA 6200	Value Creation through Financial Decision Making	3
HRMG 6200	Managing People and Organizations	3
MKTG 6200	Creating and Sustaining Customer Markets	3

Electives

Code	Title	Hours
In consultation with advisor, complete 3 graduate-level semester hours from the following for which prerequisites have been met:		3

FINA 6216	Valuation and Value Creation
HRMG 6218	Great Companies
HRMG 6223	Global Talent Management
MGMT 6214	Negotiations
MKTG 6214	New Product Development
MKTG 6216	Market Focused Strategy

Program Credit/GPA Requirements

12 total semester hours required; may complete a maximum of 15 semester hours

Minimum 3.000 GPA required

Entrepreneurship, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in Entrepreneurship (https://damore-mckim.northeastern.edu/programs/entrepreneurship-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gce) is designed to help students learn how to launch a cutting-edge venture and develop a business plan for a high-potential idea. Students have an opportunity to build a strong foundation of business knowledge that includes product development, planning, and competitive strategies.

In just four courses—with the option to take a fifth course to deepen their knowledge base—students study core business skills and essential best practices for commercializing innovation in a digital economy. Depending on their chosen electives, students explore critical topics in greater depth, such as disruptive technologies, lean design, or financing.

Program Requirements

Core Requirement

Code	Title	Hours
INNO 6200	Enterprise Growth and Innovation	3

Electives

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9

ENTR 6210	Managing Operations in Early Stage Ventures
ENTR 6212	Business Planning for New Ventures
ENTR 6214	Social Enterprise
ENTR 6218	Business Model Design and Innovation
ENTR 6240	Emerging and Disruptive Technologies
ENTR 6241	Entrepreneurial Marketing and Selling
ENTR 6250	Lean Design and Development
ENTR 6300	Managing a Technology-Based Business
GE 5030	Iterative Product Prototyping for Engineers

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

International Business, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in International Business (https://damore-mckim.northeastern.edu/programs/international-business-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gcib) helps students cultivate a global mindset and develop the cultural agility required to lead in an increasingly globalized business world.

In just four courses—with the option to take a fifth to deepen their knowledge base—students study international trade issues, legal and political considerations for decision making, international currency markets, and significant cultural and ethical issues. Depending on their chosen electives, students explore topics such as competing in emerging markets or issues affecting global supply chain design.

Program Requirements

Core Requirements

Code	Title	Hours
INTB 6200	Managing the Global Enterprise	3
INTB 6212	Cultural Aspects of International Business	3

Electives

Code	Title	Hours
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6

FINA 6204	International Financial Management
INNO 6200	Enterprise Growth and Innovation
INTB 6226	Becoming a Global Leader
INTB 6230	Global Field Study

INTB 6249	Digitization of International Business
MECN 6200	Global Competition and Market Dominance
MKTG 6212	International Marketing
SCHM 6213	Global Supply Chain Strategy

Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

Investments, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in Investments (https://damore-mckim.northeastern.edu/programs/investments-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gci) equips students with a deep understanding of global markets, financial best practices, and quantitative and analytical tools.

In just four courses—with the option to take a fifth course to deepen their knowledge base—students study cutting-edge theories and quantitative tools for identifying, valuing, and analyzing investment choices. Depending on their chosen electives, students explore critical topics in greater depth, such as real estate investing, personal financial planning, risk management, and insurance.

Program Requirements

Core Requirement

Code	Title	Hours
FINA 6203	Investment Analysis	3

Electives

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met. Some courses may also apply to requirements of the MBA program.		9

ACCT 6200	Financial Reporting and Managerial Decision Making 1
FINA 6211	Financial Risk Management
FINA 6212	Fixed-Income Securities and Risk
FINA 6213	Investment Banking
FINA 6217	Real Estate Finance and Investment
FINA 6339	Quantitative Portfolio Management
FINA 6360	Fund Management for Analysts (3 credits total)
or FINA 6361	Fund Management for Managers
HRMG 6200	Managing People and Organizations
INTB 6200	Managing the Global Enterprise
MECN 6200	Global Competition and Market Dominance
MKTG 6200	Creating and Sustaining Customer Markets
STRT 6200	Strategic Decision Making in a Changing Environment

Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

Leading People and Organizations, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Leading People and Organizations (https://damore-mckim.northeastern.edu/programs/leading-people-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gclpo) helps students develop cutting-edge skills for developing and leading successful teams.

In just four courses—with the option to take a fifth course to deepen their knowledge base—students learn essential principles for building and leading high-performing and collaborative teams. Depending on the electives chosen, students explore critical topics in greater depth, such as health organization management, negotiating, or leading for environmental sustainability.

Program Requirements

Core Requirement

Code	Title	Hours
HRMG 6200	Managing People and Organizations	3

Electives

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
HRMG 6218	Great Companies	
HRMG 6220	Health Organization Management	
HRMG 6223	Global Talent Management	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	

Program Credit/GPA Requirements

12 semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

Marketing, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Marketing (https://damore-mckim.northeastern.edu/programs/marketing-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gcm) prepares students to leverage digital marketing tools to capitalize on trends and communicate powerfully with an audience.

In just four courses—with the option to take a fifth course to deepen their knowledge base—students learn how technology transforms the ways companies engage their customers. They dive into topics such as social media, marketing research, consumer behavior, marketing analysis, planning and strategy, and innovation.

Program Requirements

Core Requirement

Code	Title	Hours
MKTG 6200	Creating and Sustaining Customer Markets	3

Electives

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

Marketing Analytics, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Marketing Analytics (https://damore-mckim.northeastern.edu/programs/marketing-analytics-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gcma) empowers students with the skills they need to turn data into smart marketing strategies.

In just four courses—with the option to take a fifth course to further their learning—students focus on the role of data and technology in a modern marketing strategy, from customer relationship management to performance measurement. They develop analytical, computational, and strategic thinking skills that will help them link the insights they generate to the marketing results they want.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6234	Marketing Analytics	3

Electives

Code	Title	Hours
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

Mutual Fund Management, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Mutual Fund Management (http://www.damore-mckim.northeastern.edu/academic-programs/certificates/mutual-fund-management/?utm_medium=website&utm_source=catalog&utm_campaign=gcmfm) helps students build the skills to become knowledgeable asset managers that create value by spotting opportunities and capitalizing on growth.

In just four courses—with the option to take a fifth course to deepen your knowledge base—students learn the essentials of managing funds, including allocating assets, managing risk, and complying with regulations. Depending on the electives chosen, students explore critical topics in greater depth, such as market analysis or fixed-income securities.

Students may enroll in our Graduate Certificate in Mutual Fund Management for part-time study.

Program Requirements

Core Requirements

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		9
FINA 6202	Analysis of Financial Institutions and Markets	
FINA 6203	Investment Analysis	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6219	Portfolio Management	
FINA 6360	Fund Management for Analysts (Complete 3 semester hours through our student managed mutual fund. Each course is 1 semester hour and may be taken multiple times.)	

Electives

Code	Title	Hours
In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met:		3
FINA 6202	Analysis of Financial Institutions and Markets	
FINA 6203	Investment Analysis	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6360	Fund Management for Analysts (Complete 3 semester hours through our student managed mutual fund. Each course is 1 semester hour and may be taken multiple times.)	

Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

Product Management, Graduate Certificate (Boston)

The Graduate Certificate in Product Management is designed for students with undergraduate degrees in a wide range of fields—including computer science, engineering, economics, business administration, design, and psychology—who want to build the skills necessary for success as product managers. This certificate equips students with the expertise to excel in this dynamic field, whether they are early career professionals, transitioning into product roles, or looking to differentiate themselves in a competitive job market. The program provides a flexible, cost-effective alternative to a full MS program while offering hands-on learning experiences.

Curriculum and Structure

This interdisciplinary certificate offers a structured yet adaptable curriculum that balances foundational knowledge with practical, industry-relevant skills.

The program consists of four courses (12–13 semester hours total):

- Three core courses covering fundamental concepts across key product management functions
- One experiential course (1 credit) providing hands-on learning opportunities tailored to students' backgrounds and career goals in product management

This certificate allows students to gain real-world experience, develop in-demand skills, and enhance their career opportunities within a streamlined, flexible structure.

Admissions and College Affiliation

Students are admitted to the certificate program through one of the following colleges and follow the academic policies of their home college:

- College of Arts, Media and Design
- College of Engineering
- D'Amore-McKim School of Business
- Office of the Provost and College of Professional Studies¹

This certificate provides a fast, flexible, and practical pathway for students looking to build expertise in product management while benefiting from Northeastern University's strong academic and professional support network.

¹ Program Structure and Transition

- For the 2025–2026 academic year, the Graduate Certificate in Product Management is being offered as a collaboration between the College of Professional Studies and the Office of the Provost. During this period, students will follow Northeastern's graduate academic calendar and be governed by the academic policies and procedures outlined in the university's *Graduate Catalog*.
- While designated under the Office of the Provost, students will receive full academic and student support services from the College of Professional Studies including academic advising, co-op and career advising, and access to the International Tutoring Center.

- Beginning in the 2026–2027 academic year, the certificate program will transition fully to the College of Professional Studies. At that time, students will be officially designated under CPS in the academic system of record and governed by its academic policies as outlined in the university's *Graduate Catalog*.

Program Requirements

Requirements

Code	Title	Hours
Fundamental Concepts		
ARTG 5600	Experience Design Studio 1: Principles	4
EMGT 6750 or PDM 6000	Advanced Product Management Foundations of Product Management	3-4
INNO 6409	Innovation Portfolio Management	4
Experiential Course		
Complete one of the following:		1
ARTG 5540	Design and Product Management	
EMGT 6760	Technical Product Management	
INNO 6411	Product Innovation Management	
PDM 6940	Product Analytics	

Program Credit/GPA Requirement

12 total semester hours required (additional hours may be required based on student choice of course options)

Minimum 3.000 GPA required

Supply Chain Management, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Supply Chain Management (https://damore-mckim.northeastern.edu/programs/supply-chain-management-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gcscm) helps students become skilled supply chain leaders who can respond to disruption with agility and confidence.

In just four courses—with the option to take a fifth course to deepen their knowledge base—students build a strong portfolio of skills for optimizing supply chains from end to end, advancing their knowledge of sourcing, logistics, inventory management, and process control. They also have the opportunity to explore elective topics important to their professional goals, such as creating and managing sustainable supply chains.

Program Requirements

Core Requirements

Code	Title	Hours
SCHM 6201	Operations and Supply Chain Management	3
SCHM 6213	Global Supply Chain Strategy	3

Electives

Code	Title	Hours
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		6
SCHM 6211	Logistics and Transportation Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Sustainability and Business, Graduate Certificate (Boston)

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Sustainability and Business (https://damore-mckim.northeastern.edu/programs/sustainability-business-certificate/?utm_medium=content&utm_source=catalog&utm_campaign=dmsb-melt-evg-glo-comp-bos-bus-gcsb-con-2022_02_25-gcsb_catalog) helps students build the skills to increase efficiency, drive value, and build trust through sustainable practices.

In just four courses—with the option to take a fifth course to expand their learning—students learn to implement sustainable business strategies to create a competitive edge for organizations. Depending on the electives chosen, students may dive into social entrepreneurship, public policy, and sustainable supply chain management.

Students may enroll in our Graduate Certificate in Sustainability and Business for part-time study.

Program Requirements

Core Requirement

Code	Title	Hours
MECN 6200	Global Competition and Market Dominance	3

Electives

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		9
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	

Program Credit/GPA Requirements

A total of 12 semester hours is required

Minimum 3.000 GPA required

Khoury College of Computer Sciences

Website (<https://khoury.northeastern.edu>)

Elizabeth Mynatt, PhD, Dean

Ben Hescott, PhD, Teaching Professor, Senior Associate Dean of Academic Programs and Student Experience

Amit Shesh, PhD, Assistant Dean of Master's Programs

Amal Ahmed, PhD, Associate Dean for Graduate Programs

Meg Bebis, Senior Director for Graduate Student Services and Career Development

617.373.6840

khoury-gradschool@northeastern.edu

At the Khoury College of Computer Sciences, we are inspired by our information-driven world and strive to make it a better place. Our students engage in rigorous learning and real-world co-op experiences. Our renowned faculty shapes minds, sparks innovation, and inspires ideas. Our interdisciplinary research breaks new ground to solve everyday problems.

Khoury maintains a strong research program with significant funding from the major federal research agencies and private industry. With a substantial increase in faculty strength and research funding in recent years, we are actively seeking highly motivated, bright, hardworking students who are interested in pursuing a PhD degree in computer science or in the interdisciplinary field of cybersecurity, network science, or personal health informatics. Graduate students and faculty members are involved in exciting projects in a wide range of research areas, including programming languages, software engineering, distributed and parallel computing, cryptography, network security, health informatics, network science, databases, information retrieval, robotics, visualization, and artificial intelligence. Colloquia and weekly research seminars contribute to the vibrant research atmosphere in the college.

Our curriculum encompasses both the breadth and depth needed for graduate school. Specialized, advanced courses for PhD students in computer science, cybersecurity, and personal health informatics are designed to prepare all students for research early in their doctoral education.

The Master of Science in Computer Science curriculum combines the study of basic algorithms and theoretical computer science principles with advanced programming and software design methods. It offers students the opportunity to develop the analytical and problem-solving skills needed to pursue challenging professional careers.

Khoury also offers the Master of Science in Cybersecurity, which focuses on information technology and incorporates the understanding of the social sciences, law, criminology, and management needed to prevent and combat cyberattacks.

In addition, we offer five interdisciplinary master's degree programs: the Master of Science in Artificial Intelligence with the College of Engineering, which provides a comprehensive framework of theory and practice in this emerging field and incorporates elements of data science, robotics, and machine learning; the Master of Science in Health Informatics with Bouvé College of Health Sciences, which seeks to prepare graduates to use information technology to improve healthcare delivery and outcomes; the Master of Science in Data Science with the College of Engineering, which is designed to give students a comprehensive framework for processing, modeling, analyzing, and reasoning about data; the Master of Science in Robotics with the College of Engineering, which offers students an opportunity to obtain a comprehensive understanding of the algorithms, sensors, control systems, and mechanisms used in robotics; and the Master of Science in Game Science and Design with the College of Arts, Media and Design, which seeks to provide students with a comprehensive understanding of how successful game products are created in a player-centric environment.

The Align program enables intellectually curious students to earn a Master of Science in Computer Science or Data Science without a background in the field. Regardless of undergraduate major or prior programming experience, Align's custom curricula is designed to prepare students for high-demand industries.

Khoury College is a tightly knit community, and the faculty, staff, and students interact regularly through town hall meetings, social gatherings, lectures, and seminars. A diverse, multicultural graduate student body and faculty encourage rich extracurricular interaction. The Master's Council organizes a number of social events to promote friendship and camaraderie within the Khoury community.

Academic Policies and Procedures

- Academic Integrity (p. 323)
- Academic Probation and Dismissal (p. 324)
- Attendance Policy (p. 324)
- Campus Transfer (p. 324)
- Certificates (p. 325)
- Course Overload (p. 325)
- Incomplete Grades (p. 326)
- Satisfactory/Unsatisfactory (Pass/Fail) Policy (p. 326)
- Reentry to Program (p. 326)
- Retaking Courses (p. 326)
- Transfer of Credit (p. 326)

Academic Integrity

Academic Integrity Violation Submission and Review Process

ACADEMIC INTEGRITY POLICY

A faculty member who suspects that a graduate student has violated the university's Academic Integrity Policy (p. 88) must offer to meet with the student to discuss the suspected violation. The faculty member may ask the student to provide supporting documentation and may gather information from other students involved in the incident.

If the faculty member finds that the student has violated the Academic Integrity Policy, the faculty member may take appropriate action and can include adjusting the student's grade, requiring additional academic work, and/or submitting a failing grade for the student's qualifying examination. The faculty member is encouraged to submit an incident report to the Office of Student Conduct and Conflict Resolution and forward the report to graduate administration at Khoury College of Computer Sciences, which handles suspected violations of the Academic Integrity Policy. Any penalties must be imposed by the faculty member within three weeks of learning of the suspected violation.

The Graduate Academic Integrity Committee regularly reviews all reports and appeals. Students will be notified of the decision made by the Graduate Academic Integrity Committee within two weeks.

Students found in violation of the Academic Integrity Policy will be placed on deferred suspension. A deferred suspension is a formal warning for a violation and remains with the student for their entire time in the program. Based on the severity of the violation, the Graduate Academic Integrity Committee may recommend one or more of the following sanctions:

- Removal of co-op privilege for the remainder of time in the MS program
- Suspension or deferral of co-op for one or two semesters
- Disqualification from paid graduate student positions within the college (i.e., graders, course assistants, TA/RA appointments)

Students deemed to be in violation of the Academic Integrity Policy for a second instance may be terminated from their graduate program.

In accordance with university policy, the college maintains the right to override decisions issued by the Office of Student Conduct and Conflict Resolution in academic performance.

Students will have the right to appeal all decisions issued by the Graduate Academic Integrity Committee. The appeals process is outlined below.

Students may also refer to the Academic Consequences for Violating the University Academic Integrity Policy in the graduate catalog (p. 91).

The Graduate Academic Integrity Committee offers a reinstatement process. Students can apply for some or all of their suspended privileges to be reinstated after three months or the next semester, whichever is later. Students are notified by the committee when they are eligible for the reinstatement process.

APPEALS PROCESS

Students are entitled to appeal all decisions made by the college's Graduate Academic Integrity Committee. The appeals committee is comprised of a graduate co-op faculty member, the senior director of graduate student services, and one Khoury faculty member. Cases submitted concerning students from interdisciplinary programs will be reviewed by an appeals committee that includes a member of college administration at the assistant dean, associate dean, or faculty level. Student appeals will be heard by the committee and then by the college senior associate dean. In the event the appeal is denied at both college levels, the student will have the right to have their appeal heard by the university's Academic Appeals Resolution Committee. College-level appeals will be heard monthly, in accordance with the Graduate Academic Integrity Committee meeting schedule.

Details regarding the university academic appeals process can be found in the graduate catalog (p. 133).

Academic Probation and Dismissal

Academic Probation and Dismissal

A student whose overall GPA falls below 3.000 will be automatically placed on academic probation and will be notified by the college. Once on probation, a student has one academic semester (summer excluded) to achieve a 3.000 GPA. If the GPA is still unsatisfactory at the end of that semester, the student will be eligible for dismissal from the graduate program. In programs that require prerequisite or Align bridge courses, these courses count toward the GPA for academic standing.

Students should refer to their program's requirements page regarding any applicable core GPA requirement.

Appeals Process

Students are entitled to appeal dismissal and dismissal override decisions made by the college's Academic Standing Committee. Appeals should be submitted within five business days of dismissal notification. All appeals to the college should be submitted in writing. The appeals committee will be comprised of the associate dean of graduate programs, the associate dean of graduate program administration, the director of graduate operations, and an academic advisor. Cases submitted concerning students from interdisciplinary programs will be reviewed by an appeals committee that includes a member of the partner college administration at the associate dean or faculty level. Student appeals will first be heard by the committee itself and then by the college dean. Appeals will be reviewed within five business days of submission by the Academic Standing Committee. In the event the appeal is denied at both college levels, the student will have the right to have their appeal heard by a provost review committee.

Details regarding the university appeal process can be found in the graduate catalog here (p. 133).

Attendance Policy

Students are expected to attend all classes and lab sections for their registered courses. Any student who anticipates missing a class due to illness or emergency situations is expected to contact their professor as soon as possible.

The Khoury College of Computer Sciences expects students who are eligible to travel over winter and summer breaks to return to campus on time and to be present for the first week of classes each term. Students who do not arrive back to campus on time may be dropped from their classes. The Office of the University Registrar posts current and future academic calendars (<https://registrar.northeastern.edu/group/calendar/>) so travel plans can be made accordingly.

Please see Attendance Requirements (p. 93) for more information.

Campus Transfer

Khoury College graduate students may request an intercampus transfer after at least one academic year (two full-time semesters) in their graduate program if their academic program is offered at the target campus. For campus transfers, the eligible full-time semesters are fall, spring, and full summer. For Align programs, students must have completed their Align Bridge coursework.

Transfer Eligibility Requirements for all Programs Except MSCS Computer Science—Align Online (p. 325)

1. Student has met with their current academic advisor to discuss transfer option.
2. Minimum of 3.000 overall grade-point average.
3. Completed two full-time academic semesters on their original campus. (*Note:* incoming students should work with the Office of Admissions to request a campus change.)
4. All Align students: successful completion of bridge courses at home campus.
5. Student is relocating for a work experience and wants to complete their academic program at the new location and can provide documentation.
6. Transfers to the Boston campus will be considered for approval if a student has secured a research assistantship opportunity and can provide documentation from their sponsoring faculty.
7. Other unique circumstances must be approved by the senior director for graduate student services.

If a student is found to misrepresent their circumstances in the intercampus transfer process, they will be referred to Khoury College's Academic Integrity Committee.

IMPORTANT CONSIDERATIONS FOR ALL MS STUDENTS

- Intercampus transfer requests are not guaranteed approval and may be denied based on capacity at their target campus. Transfers are approved or denied by Khoury's senior director for graduate student services or associate dean for graduate network.
- Students should consider living, housing, and moving expenses when considering an intercampus transfer.
- Students who cancel an approved transfer to a specific campus in a specific term will need to work with their advisor to resubmit a new transfer request if their plans change. Prior approval does not guarantee approval of a new request.
- Students considering transfer to the Vancouver campus should review Canadian study permit and co-op/internship policies here (<https://international.northeastern.edu/ogs/student-support/global-campuses/canada/>) before making their decisions. Canada's post-graduation

work permit (PGWP) has specific restrictions around the length of a program that must be completed in Canada. Students who transfer to the Vancouver campus with remaining length of their degree program of less than eight months are not eligible for the PGWP.

- Students graduating from Canadian campuses must complete a capstone course prior to graduation.
- Vancouver students considering transfer to a U.S. campus should review immigration/visa information (<https://international.northeastern.edu/ogs/new-students/>) and co-op/internship policies (<https://international.northeastern.edu/ogs/employment/off-campus-employment/>) before making their decision.

DEADLINES FOR TRANSFER (EXCLUDING VANCOUVER)

- Transfer for fall term: two weeks prior to fall registration date
- Transfer for spring term: two weeks prior to spring registration date
- Transfer for summer term: two weeks prior to summer registration date

DEADLINES FOR TRANSFER TO VANCOUVER*

- Transfer for fall term: 90 days prior to fall registration date as determined
- Transfer for spring term: 90 days prior to spring registration date
- Transfer for summer term: 90 days prior to summer registration date

MSCS Computer Science—Align Online Student Intercampus Transfer Policy

Students enrolled in the MSCS Computer Science—Align (p. 402) program (with catalog term fall 2023 onward) *for fully online course delivery* are eligible to transfer to an on-ground campus of their choosing at specific points in their program:

- MSCS Computer Science—Align (p. 402) online students in good standing can transfer to an on-ground campus after they successfully complete the Align Bridge coursework: Intensive Foundations of Computer Science (CS 5001), Discrete Structures (CS 5002), Object-Oriented Design (CS 5004), and Data Structures, Algorithms, and Their Applications within Computer Systems (CS 5008). A student who instead seeks to transfer after successful completion of two semesters of degree coursework should contact their advisor to explore general transfer eligibility requirements.

MSCS Computer Science—Align (p. 402) online students must be in good academic standing (minimum 3.000 overall GPA) and meet with their academic advisor to begin the transfer process.

* **Transfer to Vancouver requires more time due to study permit process.*

Certificates

Khoury College of Computer Sciences offers numerous graduate certificates. These certificates may be completed as stand-alone credentials or in combination with a graduate degree. The graduate certificates offer the opportunity for working professionals or graduate students to broaden their skills and knowledge or stay competitive in the job market. Graduate coursework may be completed as part of a certificate program and applied toward a graduate degree in Khoury College.

Course Overload

The full-time load for Khoury College graduate students is 8-9 credits per semester, depending on the program. For summer, students may take either of the following combinations: 8 credits over the summer full term OR 4 credits in summer first half and 4 credits in summer second half. Students are not permitted to take 8 credits in either summer first half or summer second half as these are accelerated terms.

Khoury College graduate students may request a credit overload after having earned at least 8 credits of courses and obtained an MS-level grade-point average of 3.500. The following courses excluded from consideration in the GPA include Intensive Foundations of Computer Science (CS 5001), Discrete Structures (CS 5002), Data Structures, Algorithms, and Their Applications within Computer Systems (CS 5008), Introduction to Programming for Data Science (DS 5010), Introduction to Linear Algebra and Probability for Data Science (DS 5020), Cybersecurity: Technologies, Threats, and Defenses (CY 5001)*, and Foundations of Software Security (CY 5003).

A credit overload includes a maximum of 12 credits in a fall or spring term. For summer, students may register for the following combinations: 12 credits over the summer full term OR 4 credits in summer first half, 4 credits in summer full, and 4 credits in summer second half. Students are not permitted to take 8 credits in either summer first half or summer second half as these are accelerated terms.

- * Cybersecurity: Technologies, Threats, and Defenses (CY 5001) is excluded only for students in the Master of Science in Cybersecurity—Align program.

Incomplete Grades

Students who are considering an incomplete (I) grade for a course must read Requesting and Clearing An Incomplete Grade (p. 123).

After completing the Incomplete Grade Contract (https://service.northeastern.edu/registrar/?id=kb_article_view&sysparm_article=KB000019929) with instructor's approval and signature, the student must send a copy to their academic advisor for recordkeeping.

Satisfactory/Unsatisfactory (Pass/Fail) Policy

Khoury College does not allow Khoury graduate students to elect a Satisfactory/Unsatisfactory grading scheme for courses that are letter graded.

Reentry to Program

A student not registered for a course in their program of study for three consecutive semesters will be marked inactive and withdrawn from the program. A student who has been withdrawn must reapply to their program of study.

A student may be dismissed due to an academic integrity violation, student conduct, or for making insufficient academic progress. While a student who has been dismissed can reapply for admission, their application is not likely to be considered favorable without sufficient evidence toward future student success.

A student on an official leave may return without reapplying if they return within one year from the start of their leave. A student who is on any leave for more than one year is officially withdrawn from their program and must reapply.

Readmitted students must follow the course catalog and program requirements of the academic year of readmission.

If the program is no longer offered, students must apply to a new program and meet the conditions of admission to the new program. Courses from the previous program are not guaranteed to transfer to the new program.

If readmitted, any course, course waivers, or transfer credits that a student was previously awarded will be reevaluated. There is a seven-year time limit on course transfers; any earned credit older than seven years is unlikely to transfer.

Retaking Courses

When the appropriate course is available, students may retake a nonrepeatable course up to two times to earn a better grade and must be approved by the student's academic advisor. In all cases, the most recent grade earned in a course is the one used in calculating the overall grade-point average followed by the retake notation I, indicating the course grade is included in the overall GPA; however, previous grades remain on the transcript followed by the retake notation E, signifying that that course grade has been excluded. Consult your academic advisor before retaking a course. Students are required to pay normal tuition for all retaken coursework.

When the course description for the student's registration term indicates that the course may be repeated up to a certain number of course completions, each completion of the course (up to the limit stated in the course description) will appear on the student's transcript, and the grade for each such completion will be used in the calculation of the student's overall GPA.

Transfer of Credit

Transfer of Credit Taken Before Enrollment at Khoury College

A maximum of 9 semester hours of credit obtained at another institution may be accepted toward the degree, provided the credits meet the following criteria:

- Work is completed at the graduate level for graduate credit
- Student received a grade of 3.000 or better (as per Northeastern University policy (p. 143))
- Credits were earned at an accredited institution
- Credits have not been used toward any other degree
- Credits must not be more than five years old at the time of transfer

Students can submit a request for transfer of credit after they have begun taking courses in the Khoury College of Computer Sciences. Transfer credit will be offered only for courses that match a course offered at Northeastern and that have been approved by the graduate committee. Students are advised to contact their academic advisor to submit a request.

A student currently enrolled in a Khoury degree program may not take courses outside of the college to meet degree requirements, unless the course(s) were completed before enrollment.

Transfer of Credit Taken During Enrollment at Khoury College

Once students begin their Khoury College graduate degree program, they are expected to complete all coursework for their degree at Northeastern.

Students who wish to take courses at another institution and transfer the credit to Northeastern must obtain *prior* approval from the college. This includes online and asynchronous courses.

Granting approval follows the approval policy for courses that are not part of the degree. Courses may not be approved if counting them exceeds the full-time load (or approved overload) for the semester in which they are to be taken.

Computer Science

At the Khoury College of Computer Sciences, we are inspired by an increasingly interconnected society, informed by a rapidly changing job market, and focused on addressing the challenges of a complex world. Our goal is to equip students with knowledge as diverse as it is deep. Our programs provide a strong technical foundation and an essential understanding of computing concepts while integrating computer and data sciences across disciplines and industries.

Our master's degrees are advanced programs that are designed to prepare students to be job ready through a rigorous curriculum, innovative research, experiential learning, and a collaborative environment rich in faculty expertise.

Our research-driven doctoral programs offer students an opportunity to engage in exciting projects, a vibrant community, and a challenging curriculum that offers breadth and depth in areas both within computer science and across disciplines throughout Northeastern University.

Graduate education in computer science also features the top-ranked Northeastern co-op program, enabling students to supplement their classroom education with real-world experience in the field.

Doctor of Philosophy in Computer Science

The PhD program in computer science is designed to prepare students for careers in academia and industry—from conducting research to developing systems to publishing and presenting papers. The rigorous curriculum provides a broad background in the fundamentals of computer science and advanced courses in a wide range of focus areas.

The past decade has witnessed a dramatic increase in Northeastern's international reputation for research and innovative educational programs. Since 2014, the Khoury College of Computer Sciences has hired 71 outstanding faculty members and plans to continue this strategic growth in the coming years, advancing its position (<http://csrankings.org/>) among the nation's top research universities. Today, the college has a diverse faculty (<https://www.ccis.northeastern.edu/role/tenured-and-tenure-track-faculty/>) of 103 working in a wide range of research areas (<https://www.ccis.northeastern.edu/research/research-areas/>). Forty-one faculty members have joint appointments with other colleges and schools including engineering, science, business, social sciences and humanities, health sciences, law and arts, and media and design.

Master of Science in Computer Science

Northeastern's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling students to increase their broad-based knowledge in the field while focusing on one curricular concentration selected from a range of options including artificial intelligence, computer-human interaction, graphics, programming languages, software engineering, data science, networks, theory, game design, systems, and information security.

Align Master of Science in Computer Science

MSCS—Align students come from a wide variety of backgrounds—with undergraduate majors ranging from math, biology, history, engineering, and classics. In this program, students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

MSCS—Align Online students take online courses from anywhere, with the flexibility to complete the courses fully online or transfer to one of our strategically located campuses after completing the bridge portion of the program. Align Online students will also have three in-person campus visits during the first two semesters to form peer and professional connections. The MSCS—Align Online option is not an F-1 compliant program.

Graduate Certificate in Computer Science

The postbaccalaureate certificate is designed to give students a solid foundation in the mathematical and theoretical underpinnings of computer science, including the areas of discrete mathematics, basic programming, data structures, object-oriented programming, algorithms, and computer systems. The goal of the certificate is to provide foundational knowledge in computer science that is valuable in both the workplace for career advancement as well as to those looking to move into graduate programs within the discipline.

The Graduate Certificate in Computer Science will serve as the foundational premaster's courses in the Align program.

Graduate Certificate in Data Analytics

The interdisciplinary Graduate Certificate in Data Analytics is offered through a collaboration between the Khoury College of Computer Sciences and the College of Social Sciences and Humanities. The certificate curriculum emphasizes the skills needed to bridge between emerging technological capacities and traditional policymaking processes. The program is designed to provide students with foundational knowledge in data science—including data management, machine learning, data mining, statistics, and visualizing and communicating data—that can be applied to data-driven decision making in any discipline.

Graduate Certificate in Inclusive Computer Science Education

The Graduate Certificate in Inclusive Computer Science Education is designed to prepare students to teach computer science principles and concepts in the context of a K–12 environment. Building on the successful Computer Science—Align program, this certificate assumes no prior computer science experience. Through coursework and project-based learning, students have an opportunity to obtain the foundational knowledge necessary to teach basic computing concepts and programming at a variety of educational levels both as stand-alone courses and integrated into other disciplines. The certificate emphasizes how teachers can create an inclusive classroom environment, actively work to dispel stereotypes, and build student confidence. Students who finish this certificate will be well positioned to obtain K–12 certification in computer science.

Programs

Doctor of Philosophy (PhD)

- Computer Science (Boston) (p. 329)
- Network Science (Boston) (p. 241)
- Personal Health Informatics (Boston) (p. 339)

Master of Science (MS)

- Artificial Intelligence (Boston) (p. 164)
- Artificial Intelligence (Portland) (p. 345)
- Artificial Intelligence (Seattle) (p. 346)
- Artificial Intelligence (Silicon Valley) (p. 348)
- Complex Network Analysis (Boston) (p. 166)
- Data Science (Boston) (p. 169)
- Data Science (Portland) (p. 355)
- Data Science (Silicon Valley) (p. 357)
- Data Science—Align (Boston) (p. 172)
- Data Science—Align (Portland) (p. 361)
- Data Science—Align (Silicon Valley) (p. 364)
- Extended Realities (Boston) (p. 175)
- Game Science and Design (Boston) (p. 217)
- Internet of Things (Boston) (p. 372)
- Robotics (Boston) (p. 180)
- Robotics (Seattle) (p. 184)
- Statistics (Boston) (p. 187)
- Statistics (p. 189)—Connect (Boston)

Master of Science in Computer Science (MSCS)

- Computer Science (Boston) (p. 388)
- Computer Science (Arlington) (p. 386)
- Computer Science (Miami) (p. 389)
- Computer Science (Oakland) (p. 391)
- Computer Science (Portland) (p. 392)
- Computer Science (Seattle) (p. 395)
- Computer Science (Silicon Valley) (p. 394)
- Computer Science (Vancouver) (p. 398)
- Computer Science—Align (Boston) (p. 402)
- Computer Science—Align (Arlington) (p. 400)
- Computer Science—Align (Miami) (p. 404)
- Computer Science—Align (Oakland) (p. 405)
- Computer Science—Align (Portland) (p. 407)

- Computer Science—Align (Seattle) (p. 409)
- Computer Science—Align (Silicon Valley) (p. 412)
- Computer Science—Align (Vancouver) (p. 413)

Graduate Certificate

- Computer Science (Boston) (p. 416)
- Data Analytics (Boston) (p. 416)
- Inclusive Computer Science Education (Portland) (p. 417)

Computer Science, PhD (Boston)

The PhD in Computer Science is designed to prepare students for careers in academia, industrial and national research labs, and technical leadership in industry and government. The rigorous curriculum provides a broad background in the fundamentals of computer science, advanced courses in a wide range of focus areas, and opportunity to make an impact at the forefront of computing. The program provides training in conducting research, publishing and presenting papers, developing systems, and establishing science and technology policy.

Coursework

A minimum of 48 semester hours of coursework beyond the BS/BA degree is required of all students.

All students must demonstrate sufficient knowledge in the fundamentals of computer science, as well as the ability to carry out research in an area of computer science.

The student must maintain a minimum grade-point average of 3.500 among the six core courses and receive a grade of B or better in each of these courses. Students who have taken equivalent courses in other institutions may petition to be exempted from the course(s) (subject to the approval of the PhD computer science curriculum committee). Each student may repeat a course once for no more than three out of the six courses if they do not receive a B or better in the course. Students with a Master of Science in Computer Science may petition to the PhD computer science curriculum committee for an exemption from these courses. Petition forms are available on the college website.

The fields listed do not necessarily represent areas of specialization or separate tracks within the PhD program. Rather, they attempt to delineate areas on which the student must be examined in order to measure their ability to complete the degree. Therefore, they may be adjusted in the future to reflect changes in the discipline of computer science and in faculty interests within the Khoury College of Computer Sciences. Similarly, these fields do not represent the only areas in which a student may write their dissertation. They are, however, intended to serve as a basis for performing fundamental research in computer science.

Paper Requirement

To demonstrate research ability, the student is required to submit to the PhD committee a research or a survey paper in an area of specialty under the supervision of a faculty advisor. A submitted paper from a student is considered to have fulfilled the paper requirement if:

1. The paper has been accepted by a selective conference.
2. The student has made a substantial contribution to the paper.
3. The advisor has endorsed the paper with a written statement indicating the student's contribution.
4. The PhD computer science curriculum committee has voted on a positive recommendation. The committee may require a presentation from the student before making a recommendation.

Admission to Candidacy

Upon completion of the course and the research paper requirements, the student is admitted to candidacy for the PhD degree. It is highly recommended that the student complete the candidacy requirement by the end of their second year but no later than the third year.

Residency

One year of continuous full-time study is required after admission to the PhD candidacy. It is expected that during this period the student will make substantial progress in preparing for the comprehensive examination.

Teaching Requirement

All computer science PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment, or quiz, or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

Comprehensive Examination/Dissertation Proposal

After the student has achieved sufficient depth in a field of study, they prepare a proposal for the PhD dissertation. This process should take place no later than the end of the fifth year in residence. The student prepares a dissertation proposal, which describes the proposed research, including the relevant background materials from the literature. The proposal should clearly specify the research problems to be attacked, the techniques to be used, and a schedule of milestones toward completion.

The dissertation proposal must be approved by the dissertation committee. With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD computer science curriculum committee. The four members must include the advisor, two internal members, and an external member.

Upon approval of the written proposal, the student has to present the proposed work orally in a public forum, followed by a closed-door oral examination from the dissertation committee. The student may take the dissertation proposal examination twice, at most.

Doctoral Dissertation

Upon successful completion of solving the research proposed in the dissertation proposal, the candidate has an opportunity to prepare the dissertation for approval by the dissertation committee. The dissertation must contain results of extensive research and make an original contribution to the field of computer science. The work should give evidence of the candidate's ability to carry out independent research. It is expected that the dissertation should be of sufficient quality to merit publication in a reputable journal in computer science.

Doctoral Committee

With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD computer science curriculum committee. The four members must include the advisor, two internal members, and an external member.

Dissertation Defense

The dissertation defense is held in accordance with the regulations of the University Graduate Curriculum Committee. It consists of a lecture given by the candidate on the subject matter of the dissertation. This is followed by questions from the dissertation committee and others in attendance concerning the results of the dissertation as well as any related matters. The defense is chaired by the PhD advisor.

Time and Time Limitation

After the establishment of degree candidacy, a maximum of five years will be allowed for the completion of the degree requirements, unless an extension is granted by the college graduate committee.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Coursework
 Paper requirement
 Admission to candidacy
 Residency
 Teaching requirement
 Comprehensive examination/dissertation proposal
 Doctoral dissertation
 Doctoral committee
 Dissertation defense

Course Area Requirements

A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

Students should refer to the course numbering table for graduate course leveling (p. 115).

Code	Title	Hours
Complete a total of six courses. Courses must cover at least four of the five areas, and a maximum of two courses may be at the 5000 level.		24
At least two courses must be 7000-level seminar courses.		
At least two courses must be 7000-level nonseminar courses.		
Artificial Intelligence and Data Science		
<i>Seminar Courses</i>		
CS 7170	Seminar in Artificial Intelligence	
<i>Nonseminar Courses</i>		
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	

CS 7180	Special Topics in Artificial Intelligence
CS 7200	Statistical Methods for Computer Science
CS 7240	Principles of Scalable Data Management: Theory, Algorithms, and Database Systems
CS 7280	Special Topics in Database Management
CS 7290	Special Topics in Data Science
CS 7380	Special Topics in Graphics/Image Processing
<i>Other Courses</i>	
CS 5100	Foundations of Artificial Intelligence
CS 5150	Game Artificial Intelligence
CS 5170	Artificial Intelligence for Human-Computer Interaction
CS 5180	Reinforcement Learning and Sequential Decision Making
CS 5200	Database Management Systems
CS 5330	Pattern Recognition and Computer Vision
CS 5335	Robotic Science and Systems
CS 5850	Building Game Engines
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 6240	Large-Scale Parallel Data Processing
DS 5110	Essentials of Data Science
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
Human-Computer Interaction	
<i>Seminar Courses</i>	
CS 7375	Seminar in Human-Computer Interaction
<i>Nonseminar Courses</i>	
CS 7250	Information Visualization: Theory and Applications
CS 7260	Visualization for Network Science
CS 7295	Special Topics in Data Visualization
CS 7300	Empirical Research Methods for Human Computer Interaction
CS 7340	Theory and Methods in Human Computer Interaction
CS 7390	Special Topics in Human-Centered Computing
<i>Other Courses</i>	
CS 5097	Mixed Reality
CS 5170	Artificial Intelligence for Human-Computer Interaction
CS 5340	Computer/Human Interaction
CS 6350	Empirical Research Methods
Software	
<i>Seminar Courses</i>	
CS 7470	Seminar in Programming Languages
CS 7575	Seminar in Software Engineering
<i>Nonseminar Courses</i>	
CS 7430	Formal Specification, Verification, and Synthesis
CS 7480	Special Topics in Programming Language
CS 7485	Special Topics in Formal Methods
CS 7580	Special Topics in Software Engineering
<i>Other Courses</i>	
CS 5310	Computer Graphics
CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5520	Mobile Application Development
CS 5610	Web Development

CS 6410	Compilers
CS 6510	Advanced Software Development
Systems and Security	
<i>Seminar Courses</i>	
CS 7270	Seminar in Database Systems
CS 7670	Seminar in Computer Systems
CS 7770	Seminar in Computer Networks
CS 7775	Seminar in Computer Security
<i>Nonseminar Courses</i>	
CS 7600	Intensive Computer Systems
CS 7610	Foundations of Distributed Systems
CS 7680	Special Topics in Computer Systems
CY 7790	Special Topics in Security and Privacy
<i>Other Courses</i>	
CS 5600	Computer Systems
CS 5700	Fundamentals of Computer Networking
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
CS 6760	Privacy, Security, and Usability
CY 5130	Computer System Security
CY 5150	Network Security Practices
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security
Theory	
<i>Seminar Courses</i>	
CS 7870	Seminar in Theoretical Computer Science
<i>NonSeminar Courses</i>	
CS 7800	Advanced Algorithms
CS 7805	Complexity Theory
CS 7810	Foundations of Cryptography
CS 7840	Foundations and Applications of Information Theory
CS 7880	Special Topics in Theoretical Computer Science
<i>Other Courses</i>	
CS 5800	Algorithms
CY 5120	Applied Cryptography

Electives

Code	Title	Hours
Complete 24 semester hours in the following:		24
Note: Consult faculty advisor for the other acceptable courses.		
CS 5100 to CS 5850, except CS 5340		
CS 6110 to CS 6810		
CS 7340	Theory and Methods in Human Computer Interaction	
CS 7930	Effective Scientific Writing in Computer Science	
CS 8982	Readings	

Dissertation

Code	Title	Hours
Upon achieving PhD candidacy, complete the following courses for two consecutive semesters:		
CS 9990	Dissertation Term 1	
CS 9991	Dissertation Term 2	
For remaining semester(s), complete the following (repeatable) course until graduation:		
CS 9996	Dissertation Continuation	

Program Credit/GPA Requirements

48 total semester hours required

Minimum overall 3.000 GPA required

Plan of Study

Sample Plan of Study

Year 1			
Fall	Hours	Spring	Hours
Area course		4 Area course	4
Readings		4 Readings	4
		8	8
Year 2			
Fall	Hours	Spring	Hours
Area course		4 Area course	4
Readings		4 Readings	4
		8	8
Year 3			
Fall	Hours	Spring	Hours
Area course		4 Area course	4
Readings		4 Readings	4
		8	8
Year 4			
Fall	Hours	Spring	Hours
CS 9990		0 CS 9991	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
CS 9996		CS 9996	
		0	0
Year 6			
Fall	Hours	Spring	Hours
CS 9996		CS 9996	
		0	0
Total Hours: 48			

Advanced Entry Program Requirements

Coursework

Incoming PhD in Computer Science students who have already completed a Master of Science in Computer Science or an adjacent field may petition to the PhD in Computer Science program administration for advanced entry. Advanced entry petitions are reviewed by the program administration on a case-by-case basis. Please note that advanced standing does not waive by itself any part of the PhD coursework requirements.

As a degree conferral requirement, a minimum of 16 semester hours of coursework beyond the 32 semester hours of the master's degree is required of advanced entry PhD students (48 semester hours is required of standard entry PhD students). Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each course.

Paper Requirement

Refer to the Computer Science, PhD, overview (p. 329), for research/survey paper requirements.

Admission to Candidacy

Refer to the Computer Science, PhD, overview, (p. 329) for admission to candidacy requirements.

Residency

Refer to the Computer Science, PhD, overview, (p. 329) for residency requirements.

Teaching Requirement

Refer to the Computer Science, PhD, overview, (p. 329) for the teaching requirement.

Comprehensive Examination/Dissertation Proposal

Refer to the Computer Science, PhD, overview, (p. 329) for comprehensive examination requirements.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

- Annual review
- Course requirements
- Paper requirement
- Comprehensive exam
- Teaching requirement
- Doctoral candidacy
- Dissertation committee
- Dissertation proposal
- Dissertation defense

Core Requirements

Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each course.

Code	Title	Hours
Consult your faculty advisor for acceptable courses.		16

Dissertation

Code	Title	Hours
Upon achieving PhD candidacy, complete the following courses for two consecutive semesters:		
CS 9990	Dissertation Term 1	
CS 9991	Dissertation Term 2	
For remaining semester(s), complete the following (repeatable) course until graduation:		
CS 9996	Dissertation Continuation	

Program Credit/GPA Requirements

- 16 total semester hours required
- Minimum overall 3.500 GPA required

Network Science, PhD (Boston)

The PhD in Network Science program aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is a multidisciplinary program, with members of the Northeastern University Network Science Institute (<https://www.networkscienceinstitute.org/>) representing a range of fields including computer science, information science, physics, complexity, sociology, communication, data visualization, organizational behavior, political science, population health, and epidemiology.

This doctoral program is a joint collaboration across five academic colleges. Students are admitted to the College of Social Sciences and Humanities and may choose to move to the home college of their dissertation advisor after they reach candidacy (once they pass their dissertation proposal/comprehensive exam). Students follow policies of their home college, including dissertation format and submission deadlines for graduation. Faculty supervisors may be from one of the following Northeastern academic colleges:

- College of Science
- College of Social Sciences and Humanities
- Khoury College of Computer Sciences
- Bouvé College of Health Sciences
- College of Arts, Media and Design

Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of elective courses relevant to the student’s area of research. Electives should be discussed with the student’s faculty advisor. A minimum of 40 semester hours of coursework is required, though the faculty advisor or program committee may recommend additional coursework based on student research skills.

Alternative Course Path

Students have the option to complete core coursework in their first year of study. This curriculum pathway is expected to be taken by students whose admitting advisor is located outside of the Boston campus and elsewhere in the Northeastern network.

Annual Review

A review of satisfactory progress will be ongoing and formally evaluated at the end of each academic year. Students must maintain a cumulative grade-point average of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain a 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for dismissal by the graduate program committee.

As part of the annual review process, the students will be asked to submit a summary of completed and future courses and research. Students will submit to the program committee:

- A list of courses completed in the last academic year and course plan for the following year
- A short synopsis of their research progress and research plans for the next year

Qualifying Examination

The qualifying exam is an hour-long oral examination of the material covered in the core curriculum and consists of questions selected by network science faculty. One month prior to the exam., students receive between 50 to 80 study questions to prepare. Students will be asked to give a short presentation of their research plans, followed by an oral exam where the qualifying exam panel will ask a subset of the review questions.

Students must take the exam by the fall semester of their third year. If students fail the qualifying exam on their first attempt, they may retake the exam in the following semester. Students who do not pass the exam after two attempts will be asked to leave the program.¹

Dissertation Committee

Students must confirm their dissertation advisor by the end of their second year. The dissertation advisor must be a full-time, tenured, tenure-track, research, or teaching faculty member of Northeastern. The advisor should be a network science doctoral program faculty member, unless the student receives approval by the network science program committee.

Students must confirm their dissertation committee prior to their comprehensive exam. The committee must consist of a minimum of four members:

1. A dissertation advisor
2. A core member of the Network Science Institute faculty
3. An additional tenured/tenure-track, research, or teaching faculty member from the Network Science Institute or other Northeastern faculty approved by the advisor and program committee
4. One member recognized as an expert in the specific topic of research, who can be external to Northeastern.

Dissertation Proposal (Comprehensive Examination)

The comprehensive exam should be completed in the student's fourth year of study. The exam consists of two parts: preparation of the dissertation proposal and oral presentation of the proposal. Students must prepare a written comprehensive research proposal describing the dissertation research plan including review of relevant literature, research questions, motivation, methods, any preliminary results, and potential impact. The proposal must be shared with the doctoral committee members two weeks prior to the scheduled presentation.

Students will give a 30-minute oral presentation to their committee members that is open to the public. Following the presentation, the dissertation committee will assess the proposed research plan and provide feedback to the student. If the proposal and/or presentation do not meet the expectations of the committee, the student will be asked to revise their proposal and/or their presentation. The completion of the comprehensive exam is considered successful if the dissertation committee approves as satisfactory both the written proposal and the oral presentation. Students may repeat the comprehensive exam once. If they are unsuccessful in their second attempt, the program will ask the student to leave the program.

PhD Candidacy

A student is considered a doctoral candidate upon completion of the required coursework with a minimum cumulative GPA of 3.000, a passing score on the qualification exam, and satisfactory completion of the comprehensive exam.

Dissertation

A PhD student should aim to complete their dissertation in their fifth year of study. Upon successful completion of the research plan proposed in the dissertation proposal, the candidate has an opportunity to prepare the dissertation for approval by the dissertation committee. The dissertation must contain results of extensive research and make an original contribution to the field. The work should give evidence of the candidate's ability to carry out independent research. It is expected that the dissertation consists of one or more research studies of sufficient quality to merit publication in a reputable journal(s).

Dissertation Defense

Like the dissertation proposal, the dissertation defense consists of two parts: the written dissertation and the defense oral presentation. The PhD candidate should send the written dissertation to their dissertation committee at least one month prior to the dissertation defense.

The oral dissertation defense will be open to the public and will include a Q&A session. Following the presentation, the dissertation committee will communicate their assessment of whether they consider the candidate's dissertation requirement fulfilled. Once the dissertation requirement is fulfilled, the PhD candidate is ready to graduate. Students then apply to graduate and follow the formatting guidelines and deadlines of their home college.

¹Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MS in Network Science degree. Note that no students will be admitted directly into the MS in Network Science to pursue a master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Coursework
Annual reviews
Qualifying exam
Dissertation committee
Dissertation proposal (comprehensive examination)
Dissertation
Dissertation defense

Core Requirements

Code	Title	Hours
Students must complete all 20 semester hours of the core courses listed below, unless the program director approves changes to the student's course plan:		
NETS 5116	Network Science 1	4
NETS 6116	Network Science 2	4
NETS 7332	Machine Learning with Graphs	4
NETS 7334	Social Networks	4
NETS 7335	Dynamical Processes in Complex Networks	4

Electives

Code	Title	Hours
Complete 20 semester hours from the following elective course options.		20
The student's elective course plan should be discussed with, and approved by, their advisor. Students who seek to apply courses not on this list to fulfill program requirements must obtain written approval from their advisor and the program director. Elective options below are organized by domain areas. Students may take courses from one or more domain areas.		

Computational Social Science

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5314	Complexity in Social Systems
CNET 5411	Financial and Economic Networks
CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
NETS 7341	Network Economics
NETS 7350	Bayesian and Network Statistics
NETS 7360	Research Design for Social Networks
NETS 7370	Computational Urban Science
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHYS 7332	Network Science Data 2

Computer Science

CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning

CS 6220	Data Mining Techniques
CS 7180	Special Topics in Artificial Intelligence
CS 7260	Visualization for Network Science
CS 7295	Special Topics in Data Visualization
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHYS 7332	Network Science Data 2

Epidemiology and Public Health

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5515	Complex Network Analysis for Biological Systems
CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
NETS 7370	Computational Urban Science
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6202	Intermediate Epidemiology
PHTH 6400	Principles of Population Health 1
PHTH 6410	Principles of Population Health 2
PHTH 6800	Causal Inference in Public Health Research
PHYS 7332	Network Science Data 2

Mathematic and Physics

CNET 5901	Visualizing Complex Networks
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CS 5800	Algorithms
MATH 7233	Graph Theory
MATH 7243	Machine Learning and Statistical Learning Theory 1
NETS 7976	Directed Study
NETS 8941	Network Science Literature Review Seminar
PHYS 5211	Introduction to Scientific Computing
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
PHYS 7332	Network Science Data 2

Dissertation

Code	Title	Hours

Precandidacy

Students should register for NETS 8986 after passing the qualifying exam and before completing the comprehensive exam (proposal defense):

NETS 8986	Research

Dissertation

After passing the comprehensive exam (reaching candidacy), students should register for NETS 9990 and NETS 9991, successively:

NETS 9990	Dissertation Term 1
NETS 9991	Dissertation Term 2

Dissertation Continuation

After completing both NETS 9990 and NETS 9991, students should register for NETS 9996 each semester until graduation:

NETS 9996	Dissertation Continuation

Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Typical Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
Elective course		4 NETS 7334	4
Elective course		4 One elective course	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
NETS 7332		4 NETS 7335	4
One elective course		4 One elective course	4
		8	8
Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0

Total Hours: 40

Alternate Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
NETS 7332		4 NETS 7334	4
One elective course		4 NETS 7335	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
Elective		4 Elective	4
Elective		4 Elective	4
		8	8
Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0

Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0
Total Hours: 40			

Personal Health Informatics, PhD (Boston)

Northeastern University's Doctor of Philosophy in Personal Health Informatics is a transdisciplinary doctoral program focused on educating top researchers in the theoretical underpinnings, design, evaluation, and dissemination of consumer- and patient-focused health systems. Personal health technologies are those that non-health professionals interact with *directly*, both in and out of a clinical setting and in various life stages of illness and wellness.

Examples include:

- Assistive technologies that aid persons with disabilities
- Consumer wellness promotion technologies
- Patient education and counseling systems
- Interfaces for reviewing personal health records
- Advanced ambulatory monitoring for supporting health
- Automated elder care systems that monitor health and support independent living
- Social networking systems connecting families and their social and medical support networks

Developing personal health interface technologies requires that professionals have skills and experience designing systems for individual patients and consumers with a wide range of backgrounds in different contexts using a variety of media, while ensuring that fielded technologies are effective, reliable, and responsive to the needs of at-risk and patient populations. Critical skills and knowledge include needs assessment, theories of interface design and health behavior, rapid prototyping and implementation, experimental design with human subjects in challenging settings, and statistical data analysis and validation. Moreover, these skills must be deployed while working with, or leading, transdisciplinary teams.

The interdisciplinary nature of the program targets students who are interested in improving health and wellness using novel technologies that directly impact the lives of consumers and patients. This is a program for students who are not only technically strong but also socially conscious, design oriented, and interested in rigorously evaluating the technologies they imagine and build. The program provides a path for technical students to acquire more experience in the deployment and evaluation of health technologies in the field but also a path for students with health backgrounds to develop the technical skills needed to prototype and assess creative ideas they envision for improving care. The expected length of study is five years after the bachelor's degree.

Admission Requirements

Students will be accepted with either of the following:

- A bachelor's or higher degree in a technical discipline (e.g., computer science or information science, computer systems engineering) with either academic or work experience demonstrating a commitment to working in health.
- A bachelor's or higher degree in a health science discipline (e.g., nursing, medicine, physical therapy, pharmacy, public health) with either some academic coursework in technology, such as a course in programming or design, or work experience where the applicant participated in the development, adaptation, or evaluation of consumer- or patient-facing health technology. (Otherwise outstanding applicants without programming skills may be advised to take an introductory programming course prior to entry; otherwise outstanding applicants without any formal experience working in health settings may be advised to spend some time volunteering in a medical or community health setting prior to entry.)

Applicants will be expected to have:

- A minimum 3.000 undergraduate GPA
- A minimum total GRE score of 300 or equivalent
- A minimum GRE academic writing score of 3.5
- For international applicants, a minimum TOEFL score of 105

Minimum Academic Standards and Requirements

RESIDENCY REQUIREMENT

The residency requirement will follow the university's residency requirement for PhD programs (<https://catalog.northeastern.edu/graduate/general-admission-transfer-credit/regulations-phd-programs/>).

TEACHING REQUIREMENT

All personal health informatics PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment, or quiz, or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

DISSERTATION ADVISING

Each student will have one primary advisor from the personal health informatics doctoral program faculty.

DISSERTATION COMMITTEE

The committee will consist of at least three members: the dissertation advisor, one additional personal health informatics doctoral program faculty member, and one member external to Northeastern who is an expert in the specific personal health informatics topic of research. The dissertation committee shall include experts with both health and technology backgrounds. The dissertation advisor must be a full-time member of the Northeastern faculty.

QUALIFYING EXAMINATION

The qualifying examination consists of a three-part exam conducted by a committee of three personal health informatics doctoral program faculty members, each overseeing one part of the exam. The research core of the exam is fulfilled with submission of a high-quality paper to a strong peer-reviewed conference or journal. The health component of the exam is fulfilled when the student passes a written exam developed by a faculty member with a health sciences background, and the technical component of the exam is fulfilled when the student passes an exam developed by a faculty member with a technical background. The content of the written exams and the paper topic are developed in consultation with each faculty member.

DEGREE CANDIDACY

A student is considered a PhD degree candidate upon meeting these conditions:

- Completion of core courses with a minimum GPA of 3.000 overall on the core courses
- Completion of the qualifying examination

COMPREHENSIVE EXAM

A PhD student must submit a written dissertation proposal to the dissertation committee. The proposal should identify the research problem, the research plan, and its potential impact on the field. A presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee.

DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in personal health informatics.

Curriculum Requirements

REQUIRED AND ELECTIVE COURSES

The curriculum is designed to provide all PhD students with a strong foundation in principles critical to the design and evaluation of personal health interfaces. All students take six core courses (24 semester hours) and the user-interface practicum (1 semester hour).The student must maintain a minimum GPA of 3.500 among the six core courses and receive a grade of B or better in each of these courses. All students must also fulfill the programming fundamentals requirement (4 semester hours) and the statistics fundamentals requirement (4 semester hours), where some flexibility in course selection allows tailoring based on background and experience. Two additional research electives (8 semester hours) are selected based on research interests from the personal health informatics electives list. Students are also expected to participate in the personal health informatics seminar series during semesters when it is run.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

- Qualifying examination
- Annual review
- Dissertation proposal
- Dissertation committee
- Dissertation defense

Core Requirements

A grade of B or higher is required in each course. A cumulative 3.500 grade-point average is required for the core requirement.

Code	Title	Hours
Foundations		
HINF 5200	Theoretical Foundations in Personal Health Informatics	4

Program Design and Development

CS 5010	Programming Design Paradigm (or another programming course)	4
CS 7340	Theory and Methods in Human Computer Interaction	4
HINF 5300	Personal Health Interface Design and Development	4

Methods and Statistics

CS 7300	Empirical Research Methods for Human Computer Interaction	4

Complete one of the following:

3-4

CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CS 7200	Statistical Methods for Computer Science	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	

Evaluation

HINF 5301	Evaluating Health Technologies	4
HINF 8982	Readings	1-8

Electives

Code	Title	Hours

Complete 12–17 semester hours in the following subject areas to fulfill the minimum program hours (see faculty advisor for other acceptable elective courses):

12-17

CAEP		
CS		
HINF		
HLTH		
PHTH		

Dissertation

Code	Title	Hours
HINF 9990	Dissertation Term 1	
HINF 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

Plan of Study**Sample Plan of Study**

Code	Title	Hours

Year 1*Fall Semester*

CS 7340	Theory and Methods in Human Computer Interaction	
HINF 5200	Theoretical Foundations in Personal Health Informatics	

Spring Semester

CS 5010	Programming Design Paradigm	
or CS 5520	Mobile Application Development	
CS 7300	Empirical Research Methods for Human Computer Interaction	

Year 2*Fall Semester*

HINF 5300	Personal Health Interface Design and Development	
PHTH 5210	Biostatistics in Public Health	
or PHTH 6440	Advanced Methods in Biostatistics	
or CAEP 7712	Intermediate Statistical Data Analysis Techniques	
or CS 7200	Statistical Methods for Computer Science	

Spring Semester

HINF 5301	Evaluating Health Technologies	
Personal health informatics electives		

Year 3*Fall Semester*

HINF 9990 Dissertation Term 1

HINF 8982 Readings

Spring Semester

HINF 9991 Dissertation Term 2

Personal health informatics electives

Year 4*Fall Semester*

HINF 9996 Dissertation Continuation

Spring Semester

HINF 9996 Dissertation Continuation

Year 5*Fall Semester*

HINF 9996 Dissertation Continuation

Spring Semester

HINF 9996 Dissertation Continuation

Artificial Intelligence, MS (Boston)

The Master of Science in Artificial Intelligence provides a comprehensive framework encompassing foundational algorithms, theory, and practical applications in the rapidly evolving field of AI. This program offers students the essential knowledge and skills to design, develop, and implement AI systems across various high-demand sectors. The core curriculum is designed to provide in-depth understanding of fundamental AI concepts, forming a solid foundation for both theoretical and practical aspects of artificial intelligence.

Building on this strong foundation, students can delve into advanced AI applications through interdisciplinary concentrations tailored to industry needs. These concentrations include computer vision, continuous process engineering, machine learning, and robotics and agent-based systems.

The master's in artificial intelligence is an interdisciplinary degree offered by Khoury College of Computer Sciences and the College of Engineering. Descriptions of the concentrations offered in this degree are as follows:

- **Computer Vision—College of Engineering**
 - The computer vision concentration offers students the knowledge and skills to drive innovation at the intersection of new and emerging vision systems and AI, through utilizing AI and machine learning solutions for a wide range of applications including image enhancement/restoration, object recognition, navigation, graphics rendering, and pattern classification.
- **Continuous Process Engineering—College of Engineering**
 - The continuous process engineering concentration offers students the knowledge and skills to revolutionize how industrial processes are designed, monitored, and optimized. The program aims to prepare students to utilize AI and machine learning solutions to enhance process efficiency, predictive maintenance, and real-time decision making in industries such as chemicals, pharmaceuticals, and energy. Graduates will be prepared to integrate AI-driven solutions into continuous manufacturing environments to improve safety, sustainability, and productivity.
- **Energy Systems—College of Engineering**
 - The energy systems concentration offers students the knowledge and skills to drive innovation in sustainable and intelligent energy systems. Students examine how to utilize AI and machine learning solutions to support smart energy grid operations, integrate renewable energy sources, and create responsive and resilient systems.
- **Machine Learning—Khoury College of Computer Sciences**
 - The goal of the machine learning concentration is to provide students with practical, hands-on experience in designing, implementing, and optimizing machine learning models for real-world applications. The curriculum positions graduates to pursue roles that leverage AI to drive innovation and efficiency in a wide variety of industries and domains.
- **Robotics and Agent-Based Systems—Khoury College of Computer Sciences**
 - The goal of the robotics and agent-based systems concentration is to provide students with expertise in designing and developing intelligent robotic systems and autonomous agents capable of performing complex tasks in dynamic environments. The curriculum positions graduates to pursue roles that contribute to innovations in automation, human-robot interaction, and intelligent systems design.

Students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their college of admission.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following:

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 5130	Applied Programming and Data Processing for AI	4
DADS 5200 or DS 5020	Mathematics for Machine Learning Introduction to Linear Algebra and Probability for Data Science	4
EECE 5644 or DADS 7275	Introduction to Machine Learning and Pattern Recognition Machine Learning and Data Analytics	4

Concentrations

Complete one of the following concentrations:

- Computer Vision (p. 165)—College of Engineering
- Continuous Process Engineering (p. 165)—College of Engineering
- Energy Systems (p. 165)—College of Engineering
- Machine Learning (p. 166)—Khoury College of Computer Sciences
- Robotics and Agent-Based Systems (p. 166)—Khoury College of Computer Sciences

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

COMPUTER VISION CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Complete 8 semester hours from the following:		8
EECE 5550	Mobile Robotics	
EECE 5554 or ME 5554	Robotics Sensing and Navigation Robotics Sensing and Navigation	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
Complete 4 semester hours from the following:		4
EECE 5645	Parallel Processing for Data Analytics	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering	
Capstone		
EECE 7945	Master's Project	4

CONTINUOUS PROCESS ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Students without a chemical engineering degree are advised to choose the 510X courses, which serve as a bridge from other degrees.		
Complete 8 semester hours from the following:		8
CHME 5101 and CHME 5102	Fundamentals of Chemical Engineering: Fluid, Heat, and Mass Transfer and Fundamentals of Chemical Engineering: Thermodynamics and Kinetics	
CHME 5510 and CHME 5515	Fundamentals in Process Safety Engineering and Process Safety Engineering for Biotechnology and Pharmaceutical Industries	

CHME 7600 and CHME 7601	Pharmaceutical Engineering I and Pharmaceutical Engineering II	
Complete 4 semester hours from the following:		4
CHEM 5641 and CHME 7901	Computational Chemistry and Journal Club in Chemical Engineering	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5520	Designing for Process Safety	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
IE 7270	Intelligent Manufacturing	
PHIL 5010	AI Ethics	
PHSC 5900	AI in Drug Discovery and Development	
Capstone		
CHME 6580	Artificial Intelligence for Process Engineering Capstone	4

ENERGY SYSTEMS CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Complete 12 semester hours from the following:		12
CHME 5621	Electrochemical Engineering	
CHME 5692	Carbon Capture, Utilization, and Storage	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5700	Renewable Energy Development	
ENSY 5800	Applications of Artificial Intelligence in Energy Systems	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5374	Special Topics in Mechanical Engineering	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
PHIL 5010	AI Ethics	
Capstone		
ME 7945	Master's Project	4

MACHINE LEARNING CONCENTRATION—KHOORY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
CS 5800	Algorithms	4
Complete 8 semester hours from the following:		8
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
Capstone		
Complete 4 semester hours from the following:		4
CS 6170	AI Capstone	
CS 8674	Master's Project	

ROBOTICS AND AGENT-BASED SYSTEMS CONCENTRATION—KHOORY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
CS 5800	Algorithms	4
Complete 8 semester hours from the following:		8
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
Capstone		
Complete 4 semester hours from the following:		4

CS 6170

AI Capstone

CS 8674

Master's Project

Artificial Intelligence, MS (Portland)

The Master of Science in Artificial Intelligence program is designed to give students a comprehensive framework for AI with specialization in one of five areas: vision, intelligent interaction, robotics and agent-based systems, machine learning, and knowledge management and reasoning. Students may choose from three options: specialization, thesis, or coursework only. Students will engage in an extensive core intended to develop depth in all core concepts that build a foundation for AI theory and practice. Students will also be given the opportunity to build on the core knowledge of AI by taking a variety of elective courses, selected from colleges throughout campus, to explore key contextual areas or more complex technical applications. Program graduates will be well positioned to attain research and development positions in a rapidly growing field or to progress into doctoral-degree-related fields.

The Master of Science in Artificial Intelligence is comprised of eight courses: five core courses, two electives to be chosen from one of five specialization areas or coursework option, and one elective. The core courses are designed and developed by Khoury College faculty. Elective courses consist of graduate courses offered in Khoury and other partner colleges, including College of Arts, Media and Design; College of Engineering; College of Science; and College of Social Sciences and Humanities.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses:

Code	Title	Hours
Intelligence		
CS 5100	Foundations of Artificial Intelligence	4
Programming and Algorithms		
CS 5010	Programming Design Paradigm	4
CS 5800	Algorithms	4
Machine Learning		
CS 6140	Machine Learning	4
Interaction		
CS 5170	Artificial Intelligence for Human-Computer Interaction	4

Options

Complete one of the following options:

SPECIALIZATION OPTION

Code	Title	Hours
Complete two courses from one of the following specializations:		8
Vision		
CS 5330	Pattern Recognition and Computer Vision	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5639	Computer Vision	
EECE 7370	Advanced Computer Vision	
Intelligent Interaction		
CS 5150	Game Artificial Intelligence	
CS 5340	Computer/Human Interaction	
CS 7340	Theory and Methods in Human Computer Interaction	
Robotics and Agent-Based Systems		
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
Machine Learning		

CS 5180	Reinforcement Learning and Sequential Decision Making
CS 6220	Data Mining Techniques
CS 7140	Advanced Machine Learning
or EECE 7397	Advanced Machine Learning
CS 7150	Deep Learning
DS 5230	Unsupervised Machine Learning and Data Mining
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts
EECE 5644	Introduction to Machine Learning and Pattern Recognition
MATH 7340	Statistics for Bioinformatics

Knowledge Management and Reasoning

CS 6120	Natural Language Processing
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 7290	Special Topics in Data Science

Complete one course from the electives list below or an additional course chosen from the specialization area above, outside of the student's selected specialization area. 4

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the electives or specialization course lists. Students can take up to one course from any Khoury College 5000–6000-level course.		12

THESIS OPTION

Code	Title	Hours
CS 7990	Thesis	4
CS 8674	Master's Project	4
Complete 4 semester hours from the electives or specialization course lists.		4

Electives List

Code	Title	Hours
CS 7180	Special Topics in Artificial Intelligence	
CS 8674	Master's Project	
EECE 7337	Information Theory	
GSND 5110	Game Design and Analysis	
PHIL 5010	AI Ethics	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Artificial Intelligence, MS (Seattle)

The Master of Science in Artificial Intelligence program is designed to give students a comprehensive framework for AI with specialization in one of five areas: vision, intelligent interaction, robotics and agent-based systems, machine learning, and knowledge management and reasoning. Students may choose from three options: specialization, thesis, or coursework only. Students will engage in an extensive core intended to develop depth in all core concepts that build a foundation for AI theory and practice. Students will also be given the opportunity to build on the core knowledge of AI by taking a variety of elective courses, selected from colleges throughout campus, to explore key contextual areas or more complex technical applications. Program graduates will be well positioned to attain research and development positions in a rapidly growing field or to progress into doctoral-degree-related fields.

The Master of Science in Artificial Intelligence is comprised of eight courses: five core courses, two electives to be chosen from one of five specialization areas or coursework option, and one elective. The core courses are designed and developed by Khoury College faculty. Elective courses consist of graduate courses offered in Khoury and other partner colleges, including College of Arts, Media and Design; College of Engineering; College of Science; and College of Social Sciences and Humanities.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses:

Code	Title	Hours
Intelligence		
CS 5100	Foundations of Artificial Intelligence	4
Programming and Algorithms		
CS 5010	Programming Design Paradigm	4
CS 5800	Algorithms	4
Machine Learning		
CS 6140	Machine Learning	4
Interaction		
CS 5170	Artificial Intelligence for Human-Computer Interaction	4

Options

Complete one of the following specializations:

SPECIALIZATION OPTIONS

Code	Title	Hours
Complete two courses from one of the following specializations:		8
Vision		
CS 5330	Pattern Recognition and Computer Vision	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5639	Computer Vision	
EECE 7370	Advanced Computer Vision	
Intelligent Interaction		
CS 5150	Game Artificial Intelligence	
CS 5340	Computer/Human Interaction	
CS 7340	Theory and Methods in Human Computer Interaction	
Robotics and Agent-Based Systems		
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
Machine Learning		
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 6220	Data Mining Techniques	
CS 7140	Advanced Machine Learning	
or EECE 7397	Advanced Machine Learning	
CS 7150	Deep Learning	
DS 5230	Unsupervised Machine Learning and Data Mining	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
MATH 7340	Statistics for Bioinformatics	
Knowledge Management and Reasoning		
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 7290	Special Topics in Data Science	

Complete one course from the electives list below or an additional course chosen from the specialization area above, outside of the student's selected specialization area.

4

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the electives or specialization course lists. Students can take up to one Khoury College course numbered 5100–6000 that is not included on those lists.		12

THESIS OPTION

Code	Title	Hours
CS 7990	Thesis	4
CS 8674	Master's Project	4
Complete 4 semester hours from the electives or specialization course lists.		4

ELECTIVES

Code	Title	Hours
CS 7180	Special Topics in Artificial Intelligence	
CS 8674	Master's Project	
EECE 7337	Information Theory	
GSND 5110	Game Design and Analysis	
PHIL 5010	AI Ethics	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Artificial Intelligence, MS (Silicon Valley)

The Master of Science in Artificial Intelligence program is designed to give students a comprehensive framework for AI with specialization in one of five areas: vision, intelligent interaction, robotics and agent-based systems, machine learning, and knowledge management and reasoning. Students may choose from three options: specialization, thesis, or coursework only. Students will engage in an extensive core intended to develop depth in all core concepts that build a foundation for AI theory and practice. Students will also be given the opportunity to build on the core knowledge of AI by taking a variety of elective courses, selected from colleges throughout campus, to explore key contextual areas or more complex technical applications. Program graduates will be well positioned to attain research and development positions in a rapidly growing field or to progress into doctoral-degree-related fields.

The Master of Science in Artificial Intelligence is comprised of eight courses: five core courses, two electives to be chosen from one of five specialization areas or coursework option, and one elective. The core courses are designed and developed by Khoury College faculty. Elective courses consist of graduate courses offered in Khoury and other partner colleges, including College of Arts, Media and Design; College of Engineering; College of Science; and College of Social Sciences and Humanities.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses:

Code	Title	Hours
Intelligence		
CS 5100	Foundations of Artificial Intelligence	4
Programming and Algorithms		
CS 5010	Programming Design Paradigm	4
CS 5800	Algorithms	4
Machine Learning		
CS 6140	Machine Learning	4
Interaction		
CS 5170	Artificial Intelligence for Human-Computer Interaction	4

Options

Complete one of the following options:

SPECIALIZATION OPTION

Code	Title	Hours
Complete two courses from one of the following specializations:		8
Vision		
CS 5330	Pattern Recognition and Computer Vision	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5639	Computer Vision	
EECE 7370	Advanced Computer Vision	
Intelligent Interaction		
CS 5150	Game Artificial Intelligence	
CS 5340	Computer/Human Interaction	
CS 7340	Theory and Methods in Human Computer Interaction	
Robotics and Agent-Based Systems		
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
Machine Learning		
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 6220	Data Mining Techniques	
CS 7140	Advanced Machine Learning	
or EECE 7397	Advanced Machine Learning	
CS 7150	Deep Learning	
DS 5230	Unsupervised Machine Learning and Data Mining	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
MATH 7340	Statistics for Bioinformatics	
Knowledge Management and Reasoning		
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 7290	Special Topics in Data Science	
Complete one course from the electives list below or an additional course chosen from the specialization area above, outside of the student's selected specialization area.		4

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the electives or specialization course lists. Students can take up to one course from any Khoury College 5000–6000-level course.		12

THESIS OPTION

Code	Title	Hours
CS 7990	Thesis	4
CS 8674	Master's Project	4
Complete 4 semester hours from the electives or specialization course lists.		4

Electives List

Code	Title	Hours
CS 7180	Special Topics in Artificial Intelligence	
CS 8674	Master's Project	
EECE 7337	Information Theory	
GSND 5110	Game Design and Analysis	
PHIL 5010	AI Ethics	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Complex Network Analysis, MS (Boston)

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master’s degree program in complex network analysis methodologies. The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business
4. Biological systems modeling used across research and industry including network biology, drug discovery, or multi-omics mining

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Biological Networks—College of Science
- Complex Social Systems—College of Social Sciences and Humanities
- Economic and Technological Networks—Khoury College of Computer Sciences
- Population Health Dynamics—Bouvé College of Health Sciences

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CNET 5050	Fundamentals of Complex Networks	4
CNET 5051	Analyzing Complex Network Data	4
CNET 5052	Advanced Tools for Complex Network Analysis	4
CNET 5901	Visualizing Complex Networks	2
CNET 5902	Communicating Network Data	2

Concentrations

Complete one of the following concentrations:

- Complex Biological Networks (p. 167)—College of Science
- Complex Social Systems (p. 168)—College of Social Sciences and Humanities
- Economic and Technological Networks (p. 168)—Khoury College of Computer Sciences
- Population Health Dynamics (p. 169)—Bouvé College of Health Sciences

Experiential Courses

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		4
CNET 6107	Complex Network Analysis Research Rotation	
CNET 6108	Complex Network Analysis Capstone	
CNET 6990	Thesis	

Optional Co-op

Code	Title	Hours
CNET 6000	Professional Development for Co-op	1
CNET 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

Minimum 33 total semester hours required

Additional hours may be required based on student choice of courses or concentration.

One semester hour of additional coursework is required for participation in co-op.

Minimum 3.000 GPA required

CONCENTRATION IN COMPLEX BIOLOGICAL NETWORKS—COLLEGE OF SCIENCE

Code	Title	Hours
A minimum of 16 semester hours is required to complete this concentration.		
Required		
CNET 5515	Complex Network Analysis for Biological Systems	4
Complete 8 semester hours from the following:		8
BINF 6308	Bioinformatics Computational Methods 1	
BINF 6310	Introduction to Bioinformatics	
EEMB 5130	Population Dynamics	
ENVR 5450	Applied Social-Ecological Systems Modeling	
MATH 5131	Introduction to Mathematical Methods and Modeling	
MATH 7340	Statistics for Bioinformatics	
PHYS 5211	Introduction to Scientific Computing	
Complete 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5314	Complexity in Social Systems	
CNET 5411	Financial and Economic Networks	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN COMPLEX SOCIAL SYSTEMS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
A minimum of 13 semester hours is required to complete this concentration.		
Required		
CNET 5314	Complexity in Social Systems	3
Complete a minimum of 6 semester hours from the following:		6
CNET 5311	Physical and Digital Human Traces	
CNET 5360	Research Design for Social Networks	
INSH 5301	Introduction to Computational Statistics	
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	
INSH 6300	Research Methods in the Social Sciences	
INSH 6304	Modeling and Analyzing Social Networks	
INSH 6406	Analyzing Complex Digitized Data	
INSH 6500	Statistical Analysis	
PHYS 5211	Introduction to Scientific Computing	
PPUA 5262	Big Data for Cities	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	

CNET 5411	Financial and Economic Networks
CNET 5515	Complex Network Analysis for Biological Systems
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CNET 6099	Special Topics in Complex Networks

CONCENTRATION IN ECONOMIC AND TECHNOLOGICAL NETWORKS—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours

A minimum of 14 semester hours is required to complete this concentration.

Required

CNET 5411	Financial and Economic Networks	3

Complete a minimum of 7 semester hours from the following: 7

CS 7150	Deep Learning
CS 7200	Statistical Methods for Computer Science
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
MISM 6212	Data Mining and Machine Learning for Business
PHYS 5211	Introduction to Scientific Computing

Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section): 4

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5314	Complexity in Social Systems
CNET 5515	Complex Network Analysis for Biological Systems
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CNET 6099	Special Topics in Complex Networks

CONCENTRATION IN POPULATION HEALTH DYNAMICS—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours

A minimum of 14 semester hours is required to complete this concentration.

Required

CNET 5126	Spreading on Networks: From Epidemics to Memes	4

Complete a minimum of 6 semester hours from the following: 6

BINF 6308	Bioinformatics Computational Methods 1
PHTH 5210	Biostatistics in Public Health
PHTH 6210	Applied Regression Analysis
PHTH 6224	Social Epidemiology
PHTH 6440	Advanced Methods in Biostatistics
PHTH 6800	Causal Inference in Public Health Research
PHTH 6801	Causal Inference 1
PHYS 5211	Introduction to Scientific Computing

Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section): 4

CNET 5314	Complexity in Social Systems
CNET 5411	Financial and Economic Networks
CNET 5515	Complex Network Analysis for Biological Systems
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CNET 6099	Special Topics in Complex Networks

Data Science, MS (Boston)

Khoury College of Computer Sciences and the College of Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses

from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science—Align fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Engineering Theory and Modeling—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 113).

Data Science Core

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Programming with Data		
DS 5110	Essentials of Data Science	4
Algorithms		
CS 5800 or EECE 7205	Algorithms Fundamentals of Computer Engineering	4
Machine Learning		
CS 6140 or EECE 5644	Machine Learning Introduction to Machine Learning and Pattern Recognition	4
Interdisciplinary Capstone		
DS 5500	Data Science Capstone	4

Data Science Concentration Options

Complete one of the following concentrations:

- Computer Science (p. 170)—Khoury College of Computer Sciences
- Engineering Theory and Modeling (p.)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Complete 16 semester hours from the following: ¹		16
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	

CS 6350	Empirical Research Methods
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
CS 7140	Advanced Machine Learning
CS 7150	Deep Learning
CS 7180	Special Topics in Artificial Intelligence
CS 7200	Statistical Methods for Computer Science
CS 7250	Information Visualization: Theory and Applications
CS 7280	Special Topics in Database Management
CS 7290	Special Topics in Data Science
CS 7990	Thesis
CS 8674	Master's Project
DS 7995	Project

ENGINEERING THEORY AND MODELING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Foundational Courses		
Complete 4 semester hours from the following: ¹		4
DS 7995	Project	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7346	Probabilistic System Modeling and Analysis	
IE 6400	Foundations for Data Analytics Engineering	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
Translational and Advanced Courses		
Complete the remaining 12 semester hours from the following:		12
BIOE 5750	Modeling and Inference in Bioengineering	
BIOE 5880	Computational Methods in Systems Bioengineering	
BIOE 6200	Mathematical Methods in Bioengineering	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5645	Parallel Processing for Data Analytics	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7215	Introduction to Distributed Intelligence	
EECE 7223	Riemannian Optimization	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	

EECE 7945	Master's Project
IE 5137	Computational Modeling in Industrial Engineering
IE 5390	Structured Data Analytics for Industrial Engineering
IE 5630	Biosensor and Human Behavior Measurement
IE 5640	Data Mining for Engineering Applications
IE 6400	Foundations for Data Analytics Engineering
IE 6600	Computation and Visualization for Analytics
IE 6700	Data Management for Analytics
IE 6750	Data Warehousing and Integration
IE 7270	Intelligent Manufacturing
IE 7275	Data Mining in Engineering
IE 7280	Statistical Methods in Engineering
IE 7295	Applied Reinforcement Learning in Engineering
IE 7300	Statistical Learning for Engineering
IE 7500	Applied Natural Language Processing in Engineering
IE 7615	Neural Networks and Deep Learning

¹ Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional hour, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Data Science, MS (Portland)

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science (p. 361)– (<https://catalog.northeastern.edu/graduate/computer-information-science/computer-science/data-science-ms/#alignprogramrequirementstext>) Align (p. 361) fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 115).

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Complete 20 semester hours from the following:		
Data Management and Processing		
DS 5110	Essentials of Data Science	4
Algorithms		
Complete 4 semester hours from the following:		
CS 5800	Algorithms	4
EECE 7205	Fundamentals of Computer Engineering	4
Machine Learning and Data Mining		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
Presentation and Visualization		
DS 5500	Data Science Capstone	4

Electives

Code	Title	Hours
Complete 12 semester hours from the following: ¹		12
Khoury College of Computer Sciences		
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7250	Information Visualization: Theory and Applications	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
DS 5983	Topics in Data Science	
DS 7990	Thesis	
DS 7995	Project	
College of Engineering		
CIVE 7100	Time Series and Geospatial Data Sciences	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5645	Parallel Processing for Data Analytics	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
IE 6700	Data Management for Analytics	
IE 7280	Statistical Methods in Engineering	
College of Social Sciences and Humanities		
ECON 5140	Applied Econometrics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5266	Urban Theory and Science	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
College of Science		
ENVR 5563	Advanced Spatial Analysis	
PHYS 5116	Network Science I	
PHYS 7305	Statistical Physics	
PHYS 7321	Computational Physics	
Bouvé College of Health Sciences		
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6224	Social Epidemiology	

College of Arts, Media and Design

GSND 5110	Game Design and Analysis
GSND 6350	Data-Driven Game Design

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

- ¹ Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional credit, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Data Science, MS (Silicon Valley)

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science (<https://catalog.northeastern.edu/graduate/computer-information-science/computer-science/data-science-ms-align/>)— (<https://catalog.northeastern.edu/graduate/computer-information-science/computer-science/data-science-ms/#alignprogramrequirementstext>) Align (<https://catalog.northeastern.edu/graduate/computer-information-science/computer-science/data-science-ms-align/>) fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 115).

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Data Management and Processing		
DS 5110	Essentials of Data Science	4
Algorithms		
Complete 4 semester hours from the following:		4
CS 5800	Algorithms	
EECE 7205	Fundamentals of Computer Engineering	
Machine Learning and Data Mining		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
Presentation and Visualization		
DS 5500	Data Science Capstone	4

Electives

Code	Title	Hours
Complete 12 semester hours from the following: ¹		12

Khoury College of Computer Sciences

CS 5100	Foundations of Artificial Intelligence
CS 5180	Reinforcement Learning and Sequential Decision Making
CS 5200	Database Management Systems
CS 5330	Pattern Recognition and Computer Vision
CS 5340	Computer/Human Interaction
CS 5610	Web Development

CS 6120	Natural Language Processing
CS 6200	Information Retrieval
CS 6240	Large-Scale Parallel Data Processing
CS 6350	Empirical Research Methods
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
CS 7140	Advanced Machine Learning
CS 7150	Deep Learning
CS 7180	Special Topics in Artificial Intelligence
CS 7200	Statistical Methods for Computer Science
CS 7250	Information Visualization: Theory and Applications
CS 7280	Special Topics in Database Management
CS 7290	Special Topics in Data Science
DS 5983	Topics in Data Science
DS 7990	Thesis
DS 7995	Project
College of Engineering	
CIVE 7100	Time Series and Geospatial Data Sciences
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5645	Parallel Processing for Data Analytics
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
IE 6700	Data Management for Analytics
IE 7280	Statistical Methods in Engineering
College of Social Sciences and Humanities	
ECON 5140	Applied Econometrics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5266	Urban Theory and Science
PPUA 7237	Advanced Spatial Analysis of Urban Systems
College of Science	
ENVR 5563	Advanced Spatial Analysis
PHYS 5116	Network Science 1
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
Bouvé College of Health Sciences	
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6224	Social Epidemiology
College of Arts, Media and Design	
GSND 5110	Game Design and Analysis
GSND 6350	Data-Driven Game Design

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

¹ Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional credit, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Data Science, MS—Align (Boston)

Khoury College of Computer Sciences and the College of Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science—Align fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

The Master of Science in Data Science—Align curriculum is specifically designed to prepare incoming students without any prior programming experience. During the first semester of year one, students are expected to take foundational courses in computer science fundamentals, as well as a course in data structures/discrete mathematics. During their second semester, students will take coursework in programming for data science, as well as linear algebra and probability.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Engineering Theory and Modeling—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 113).

Align Bridge Coursework

Students are required to complete all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Programming for Data Science		
DS 5010	Introduction to Programming for Data Science	4
Additional Align Coursework		
DS 5020	Introduction to Linear Algebra and Probability for Data Science	4

Data Science Core

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Programming with Data		
DS 5110	Essentials of Data Science	4
Algorithms		
CS 5800 or EECE 7205	Algorithms Fundamentals of Computer Engineering	4
Machine Learning		
CS 6140 or EECE 5644	Machine Learning Introduction to Machine Learning and Pattern Recognition	4

Interdisciplinary Capstone

DS 5500	Data Science Capstone	4

Data Science Concentration Options

Complete one of the following concentrations:

- Computer Science (p. 173)—Khoury College of Computer Sciences
- Engineering Theory and Modeling (p.)—College of Engineering

Program Credit/GPA Requirements

40–48 total semester hours required

Minimum 3.000 GPA required

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Complete 16 semester hours from the following: ¹		16
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7250	Information Visualization: Theory and Applications	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
CS 7990	Thesis	
CS 8674	Master's Project	
DS 7995	Project	

ENGINEERING THEORY AND MODELING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Foundational Courses		
Complete 4 semester hours from the following: ¹		4
DS 7995	Project	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7346	Probabilistic System Modeling and Analysis	
IE 6400	Foundations for Data Analytics Engineering	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	

Translational and Advanced Courses

Complete the remaining 12 semester hours from the following:

12

BIOE 5750	Modeling and Inference in Bioengineering
BIOE 5880	Computational Methods in Systems Bioengineering
BIOE 6200	Mathematical Methods in Bioengineering
CHME 5137	Computational Modeling in Chemical Engineering
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences
CIVE 7100	Time Series and Geospatial Data Sciences
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering
EECE 5360	Combinatorial Optimization
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty
EECE 5626	Image Processing and Pattern Recognition
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5642	Data Visualization
EECE 5645	Parallel Processing for Data Analytics
EECE 7204	Applied Probability and Stochastic Processes
EECE 7215	Introduction to Distributed Intelligence
EECE 7223	Riemannian Optimization
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
EECE 7945	Master's Project
IE 5137	Computational Modeling in Industrial Engineering
IE 5390	Structured Data Analytics for Industrial Engineering
IE 5630	Biosensor and Human Behavior Measurement
IE 5640	Data Mining for Engineering Applications
IE 6400	Foundations for Data Analytics Engineering
IE 6600	Computation and Visualization for Analytics
IE 6700	Data Management for Analytics
IE 6750	Data Warehousing and Integration
IE 7270	Intelligent Manufacturing
IE 7275	Data Mining in Engineering
IE 7280	Statistical Methods in Engineering
IE 7295	Applied Reinforcement Learning in Engineering
IE 7300	Statistical Learning for Engineering
IE 7500	Applied Natural Language Processing in Engineering
IE 7615	Neural Networks and Deep Learning

¹ Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional 1 semester hour, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Data Science, MS—Align (Portland)

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science (p. 355) or Master of Science in Data Science—Align fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

The Master of Science in Data Science—Align curriculum is specifically designed to prepare incoming students without any prior programming experience. During the first semester of year one, students are expected to take foundational courses in computer science fundamentals, as well as a course in data structures/discrete mathematics. During their second semester, students will take coursework in programming for data science, as well as linear algebra and probability.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 115).

Align Bridge Coursework

Students are required to complete all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
<i>Fundamentals</i>		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
<i>Discrete Structures</i>		
CS 5002	Discrete Structures	4
<i>Programming for Data Science</i>		
DS 5010	Introduction to Programming for Data Science	4
Additional Align Coursework		
DS 5020	Introduction to Linear Algebra and Probability for Data Science	4

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses:

Code	Title	Hours
Complete 20 semester hours from the following:		
Algorithms		
Complete 4 semester hours from the following:		
CS 5800	Algorithms	4
EECE 7205	Fundamentals of Computer Engineering	
Data Management and Processing		
DS 5110	Essentials of Data Science	4
Machine Learning and Data Mining		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
Presentation and Visualization		
DS 5500	Data Science Capstone	4

Electives¹

Code	Title	Hours
Complete 12 semester hours from the following:		
Khoury College of Computer Sciences		
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	

CS 6240	Large-Scale Parallel Data Processing
CS 6350	Empirical Research Methods
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
CS 7140	Advanced Machine Learning
CS 7150	Deep Learning
CS 7180	Special Topics in Artificial Intelligence
CS 7200	Statistical Methods for Computer Science
CS 7250	Information Visualization: Theory and Applications
CS 7280	Special Topics in Database Management
CS 7290	Special Topics in Data Science
DS 7990	Thesis
DS 7995	Project
College of Engineering	
CIVE 7100	Time Series and Geospatial Data Sciences
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5645	Parallel Processing for Data Analytics
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
IE 6700	Data Management for Analytics
IE 7280	Statistical Methods in Engineering
College of Social Sciences and Humanities	
ECON 5140	Applied Econometrics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5266	Urban Theory and Science
PPUA 7237	Advanced Spatial Analysis of Urban Systems
College of Science	
ENVR 5563	Advanced Spatial Analysis
PHYS 5116	Network Science 1
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
Bouvé College of Health Sciences	
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6224	Social Epidemiology
College of Arts, Media and Design	
GSND 5110	Game Design and Analysis
GSND 6350	Data-Driven Game Design

Program Credit/GPA Requirements

40–48 total semester hours required

Minimum 3.000 GPA required

¹ Students taking electives worth less than 4 SH (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative SH to 4. In order to earn this additional 1 SH, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Data Science, MS—Align (Silicon Valley)

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science (p. 357) or Master of Science in Data Science—Align fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

The Master of Science in Data Science—Align curriculum is specifically designed to prepare incoming students without any prior programming experience. During the first semester of year one, students are expected to take foundational courses in computer science fundamentals, as well as a course in data structures/discrete mathematics. During their second semester, students will take coursework in programming for data science, as well as linear algebra and probability.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 115).

Align Bridge Coursework

Students are required to complete all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Programming for Data Science		
DS 5010	Introduction to Programming for Data Science	4
Additional Align Coursework		
DS 5020	Introduction to Linear Algebra and Probability for Data Science	4

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses:

Code	Title	Hours
Algorithms		
Complete 4 semester hours from the following:		4
CS 5800	Algorithms	
EECE 7205	Fundamentals of Computer Engineering	
Data Management and Processing		
DS 5110	Essentials of Data Science	4
Machine Learning and Data Mining		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
Presentation and Visualization		
DS 5500	Data Science Capstone	4

Electives¹

Code	Title	Hours
Complete 12 semester hours from the following:		12
Khoury College of Computer Sciences		
CS 5100	Foundations of Artificial Intelligence	

CS 5180	Reinforcement Learning and Sequential Decision Making
CS 5200	Database Management Systems
CS 5330	Pattern Recognition and Computer Vision
CS 5340	Computer/Human Interaction
CS 5610	Web Development
CS 6120	Natural Language Processing
CS 6200	Information Retrieval
CS 6240	Large-Scale Parallel Data Processing
CS 6350	Empirical Research Methods
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
CS 7140	Advanced Machine Learning
CS 7150	Deep Learning
CS 7180	Special Topics in Artificial Intelligence
CS 7200	Statistical Methods for Computer Science
CS 7250	Information Visualization: Theory and Applications
CS 7280	Special Topics in Database Management
CS 7290	Special Topics in Data Science
DS 5983	Topics in Data Science
DS 7990	Thesis
DS 7995	Project

College of Engineering

CIVE 7100	Time Series and Geospatial Data Sciences
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5645	Parallel Processing for Data Analytics
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
IE 6700	Data Management for Analytics
IE 7280	Statistical Methods in Engineering

College of Social Sciences and Humanities

ECON 5140	Applied Econometrics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5266	Urban Theory and Science
PPUA 7237	Advanced Spatial Analysis of Urban Systems

College of Science

ENVR 5563	Advanced Spatial Analysis
PHYS 5116	Network Science 1
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics

Bouvé College of Health Sciences

PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6224	Social Epidemiology

College of Arts, Media and Design

GSND 5110	Game Design and Analysis
GSND 6350	Data-Driven Game Design

Program Credit/GPA Requirements

40–48 total semester hours required

Minimum 3.000 GPA required

¹ Students taking electives worth less than 4 SH (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative SH to 4. In order to earn this additional 1 SH, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Extended Realities, MS (Boston)

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality.

This program is structured to allow students flexibility and specialization to choose a path that matches their interest. Students have an opportunity to focus on a concentration area that matches their professional background and aspirations.

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their home college. The concentrations are associated with the following colleges:

- Khoury College of Computer Sciences
 - Artificial Intelligence
 - Human Computer Interaction
- D'Amore-McKim School of Business
 - Entrepreneurship
 - Marketing
- Bouvé College of Health Sciences
 - Human Movement Science
- College of Social Sciences and Humanities
 - Information Ethics
 - Public History
- College of Engineering
 - Wireless Networking
- College of Arts, Media and Design
 - XR and Design
 - XR and Games
 - XR and Media

The Master of Science in Extended Realities welcomes students from a diverse range of backgrounds because of the applications of XR technology used in many disciplines and industries including medicine, business, entertainment, architecture, and journalism.

Some concentrations may require a technical background and are noted in the requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Extended Reality Core

Code	Title	Hours
Required Courses		
EXRE 5010 and EXRE 5011	Immersive Media: Extended Realities (XR) History, Theory, and Impact and Seminar for EXRE 5010	5
EXRE 5020	Developing Extended Realities (XR)	4
EXRE 5030	Designing Extended Realities (XR)	4
EXRE 7500 or EXRE 7990	Extended Realities (XR) Project Thesis	4
GSND 5122	Business Models in the Game Industry	1

Extended Reality Concentration Options

Complete one of the following options:

- Artificial Intelligence (p. 176)—Khoury College of Computer Sciences
- Entrepreneurship (p. 176)—D'Amore-McKim School of Business
- Human Computer Interaction (p. 176)—Khoury College of Computer Sciences

- Human Movement Science (p. 176)—Bouv  College of Health Sciences
- Information Ethics (p. 177)—College of Social Sciences and Humanities
- Marketing (p. 177)—D'Amore-McKim School of Business
- Public History (p. 177)—College of Social Sciences and Humanities
- Wireless Networking (p. 178)—College of Engineering
- XR and Design (p. 178)—College of Arts, Media and Design
- XR and Games (p. 178)—College of Arts, Media and Design
- XR and Media (p. 178)—College of Arts, Media and Design

Program Credit/GPA Requirements

34 total semester hours required. Some concentrations may require more than 34 semester hours to complete.

Minimum 3.000 GPA required

CONCENTRATION IN ARTIFICIAL INTELLIGENCE—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Requires a background in computer science.		
CS 5097	Mixed Reality	4
CS 5100	Foundations of Artificial Intelligence	4
CS 6120	Natural Language Processing	4
CS 6140	Machine Learning	4
or DS 5220	Supervised Machine Learning and Learning Theory	

CONCENTRATION IN ENTREPRENEURSHIP—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
INNO 6200	Enterprise Growth and Innovation	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
GE 5030	Iterative Product Prototyping for Engineers	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

CONCENTRATION IN HUMAN COMPUTER INTERACTION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Required Courses		
CS 5340	Computer/Human Interaction	4
Electives		
Complete 12 semester hours from the following:		12
ARTG 5710	Design for Dignity	
CS 5097	Mixed Reality	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 6350	Empirical Research Methods	
CS 7390	Special Topics in Human-Centered Computing	
GSND 6340	Biometrics of Design	

CONCENTRATION IN HUMAN MOVEMENT SCIENCE—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
Required Courses		
GSND 6340	Biometrics of Design	4
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
Electives		
Complete 7–8 semester hours from the following:		7-8
PT 5133	Kinesiology	
PT 5150	Motor Control, Development, and Learning	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 5410	Functional Human Neuroanatomy	
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	
PT 7020	Technologies in Movement and Rehabilitation Science	

CONCENTRATION IN INFORMATION ETHICS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
Electives		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MARKETING—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

CONCENTRATION IN PUBLIC HISTORY—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
HIST 5237	Issues and Methods in Public History	4
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1 (to be taken twice)	
Electives		
Complete 8 semester hours from the following:		8

HIST 5241	Exhibits and Museums
HIST 7250	Topics in Public History (Public History and Slavery)
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)

CONCENTRATION IN WIRELESS NETWORKING—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
EECE 5512	Networked XR Systems	
EECE 7374	Fundamentals of Computer Networks	
Electives		
Complete 8 semester hours from the following:		8
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	

CONCENTRATION IN XR AND DESIGN—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5640	Prototyping for Experience Design	4
EXRE 6500	Extended Realities (XR) Studio	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN XR AND GAMES—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
Electives		
Complete 8 semester hours from the following:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6001	Advanced Topics in Game Science	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6330	Player Experience	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	
GSND 6460	Generative Game Design	

CONCENTRATION IN XR AND MEDIA—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4

Elective

Complete 4 semester hours from the following:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics	
JRNL 6341	Telling Your Story with Data	

Plan of Study**Sample Plan of Study**

The following is a sample plan of study for a student in the Concentration in XR and Games.

Year 1			
Fall	Hours	Spring	Hours
EXRE 5010 and EXRE 5011		5 EXRE 5030	4
EXRE 5020		4 GSND 5110 and GSND 5111	5
		9	9
Year 2			
Fall	Hours	Spring	Hours
EXRE 6500		4 EXRE 7500	4
GSND 5122		1 XR and games elective 2	4
XR and games elective 1		4	
		9	8
Total Hours: 35			

Game Science and Design, MS (Boston)

The Master of Science (MS) in Game Science and Design is a program that seeks to give students a comprehensive understanding of how successful game products are created in a player-centric environment. Successful graduates who wish to become professional game developers or game user research experts should be able to collaborate effectively in this dynamic and burgeoning field of practice and research. Focusing on the science of game development, students have an opportunity to learn the design and technological skills needed to build a game and develop a deep understanding of playability and analytics that makes products successful in an increasingly competitive marketplace.

The game industry has expanded to include social and mobile gaming; augmented and virtual reality; as well as games in health, education, and training. Rapid innovations are happening in player psychology, middleware, graphics and authoring tools, game mechanics, and artificial intelligence and narrative techniques. It has become an increasingly competitive space.

The selectiveness of the industry and the diversity of the skills required mean that students seeking entry need both broad and deep skills. As an emergent industry using diverse technology and collaborative practices, the game industry needs professionals with interdisciplinary skill sets who can blend knowledge about development with knowledge about evaluation methods and players' behavior and psychology.

Jointly offered by Northeastern's College of Arts, Media and Design and Khoury College of Computer Sciences (<https://www.khoury.northeastern.edu/>), the **Master of Science in Game Science and Design** is a one-of-a-kind interdisciplinary program that seeks to prepare students to meet this need by weaving together science and design. This is a two-year, 34-semester-hours program.

All admitted students will be assigned to an advisor who will help them select a pathway with a coherent set of electives depending on their career goals. The advisor will also monitor their progress through the master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
GSND 5122	Business Models in the Game Industry	1

GSND 5130	Mixed Research Methods for Games	4

Thesis

Students complete Games Project, then select either Thesis or a second completion of Games Project, in consultation with the program coordinator.

GSND 7995	Games Project	4

Thesis Conclusion

Complete an additional 4 Semester Hours from the following:

GSND 7990	Thesis	4
GSND 7995	Games Project	

Core Electives

Code	Title	Hours

Game Design

Complete one of the following: 4

GSND 6000	Advanced Topics in Game Design	4
GSND 6225	Applied Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	

Game Science

Complete one of the following: 4

GSND 6001	Advanced Topics in Game Science	4
GSND 6320	Psychology of Play	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	

Other Electives

Code	Title	Hours

Complete any two (8 Semester Hours) of the following courses listed. 8

If ARTG 5000 or GSND 6000 or GSND 6001 is completed more than once, the additional completions may be allowed toward the electives.

Elective courses outside of CAMD are subject to availability and registration policy of the home college.

Science

CS 5340	Computer/Human Interaction	4
PSYC 4612	Laboratory in Cognition	

Programming

CS 5150	Game Artificial Intelligence	4
CS 5850	Building Game Engines	
GSND 6460	Generative Game Design	

Art

ARTG 5000	Topics in Design	4
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5130	Visual Communication for Information Design	
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	

Extended Realities

EXRE 5010	Immersive Media: Extended Realities (XR) History, Theory, and Impact	4
EXRE 5011	Seminar for EXRE 5010	
EXRE 5020	Developing Extended Realities (XR)	
EXRE 5030	Designing Extended Realities (XR)	

Other

ARTG 5310	Visual Cognition	4
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5610	Design Systems	
ARTG 5640	Prototyping for Experience Design	
ARTG 6310	Design for Behavior and Experience	

CS 5520	Mobile Application Development
CS 5610	Web Development
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5302	Information Design and Visual Analytics
JRNL 6341	Telling Your Story with Data

Program Credit/GPA Requirements

34 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Sample Plan of Study

TWO YEARS, ONE (OPTIONAL) CO-OP

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
GSND 5110		4 Elective		4 Co-op (optional)	0
GSND 5111		1 Elective		4	
GSND 5130		4			
		9		8	0
Year 2					
Fall	Hours	Spring	Hours		
GSND 5122		1 GSND 7990 or 7995		4	
GSND 7995		4 Elective		4	
Elective		4			
		9		8	

Total Hours: 34

Internet of Things, MS (Boston)

The Master of Science in Internet of Things is an interdisciplinary program administered by the Institute for the Wireless Internet of Things, the Department of Electrical and Computer Engineering, and the Khoury College of Computer Sciences. This program is aimed at preparing highly qualified researchers and a specialized workforce that will lead the development of a globally interconnected continuum of untethered devices and objects interacting with the physical environment, people, and each other. The program will provide students with the necessary knowledge and skills to understand, design, and implement autonomous wireless networked systems of tomorrow operating in uncertain, challenging, extreme environments through a combination of coursework, master project research, and/or industry experience.

Program Requirements

Fundamental Requirements

Code	Title	Hours
EECE 5155	Wireless Sensor Networks and the Internet of Things	4
Complete one of the following:		4
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	
Complete one of the following:		4
CS 5800	Algorithms	
CS 7800	Advanced Algorithms	
EECE 7205	Fundamentals of Computer Engineering	
Complete one of the following:		4
CS 6140	Machine Learning	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning and Edge Computing in Wireless Networks)	
Complete one of the following:		4

EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7390	Computer Hardware Security	
EECE 7368	High-Level Design of Hardware-Software Systems	
Complete one of the following for a total of 4 semester hours:		4
EECE 5698	Special Topics in Electrical and Computer Engineering (Spectrum Policy Issues for Wireless Communications Innovators)	
INNO 6230 and EECE 6400	Platform Innovation and Special Problems in Electrical and Computer Engineering	
HRMG 6280 and EECE 6400	The Human Side of Innovation and Special Problems in Electrical and Computer Engineering	
Complete one of the following:		4
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
EECE 5641	Introduction to Software Security	
EECE 5699	Computer Hardware and System Security	

Options

COURSEWORK OPTION

Code	Title	Hours
Complete 4 semester hours from the electives course list below. (p. 373)		4

MASTER'S PROJECT OPTION

Code	Title	Hours
EECE 7945	Master's Project	4

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Electives Course List

Any course in the following list will fulfill the coursework option, provided the student satisfies prerequisites and program requirements. Students can take courses outside this list with prior approval from the program director.

Code	Title	Hours
Courses in College of Engineering		
<i>Bioengineering</i>		
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
<i>Civil and Environmental Engineering</i>		
CIVE 5280	Remote Sensing of the Environment	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
CIVE 7380	Performance Models and Simulation of Transportation Networks	

Electrical and Computer Engineering

EECE 5155	Wireless Sensor Networks and the Internet of Things
EECE 5360	Combinatorial Optimization
EECE 5550	Mobile Robotics
EECE 5554	Robotics Sensing and Navigation
EECE 5576	Wireless Communication Systems
EECE 5606	Micro- and Nanofabrication
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5641	Introduction to Software Security
EECE 5642	Data Visualization
EECE 5643	Simulation and Performance Evaluation
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 5645	Parallel Processing for Data Analytics
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology
EECE 5652	Microwave Circuits and Systems
EECE 5666	Digital Signal Processing
EECE 5693	Electromagnetic Devices for RF and Wireless Communications
EECE 5697	Acoustics and Sensing
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networked XR Systems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Spectrum Policy Issues for Wireless Communications Innovators)
EECE 5698	Special Topics in Electrical and Computer Engineering (Terahertz Communication for 6G)
EECE 5699	Computer Hardware and System Security
EECE 7150	Autonomous Field Robotics
EECE 7200	Linear Systems Analysis
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7240	Analog Integrated Circuit Design
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7275	Antennas and Radiation
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7390	Computer Hardware Security

EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Communication Electronics)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances on Deep Learning)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Wireless Communications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (An Experimental Approach to Wireless Communications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning and Edge Computing in Wireless Networks)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Security in Large-Scaled Learning Enabled Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Network Systems and Applications)

Courses Outside College of Engineering**Khoury College of Computer Science***Computer Science*

CS 5700	Fundamentals of Computer Networking
CS 5800	Algorithms
CS 6140	Machine Learning
CS 7150	Deep Learning
CS 7800	Advanced Algorithms

Cybersecurity

CY 5120	Applied Cryptography
CY 5130	Computer System Security
CY 5150	Network Security Practices
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
CY 6740	Network Security
CY 6760	Wireless and Mobile Systems Security

D'Amore-McKim School of Business*Entrepreneurship and Innovation*

INNO 6200	Enterprise Growth and Innovation
INNO 6230	Platform Innovation
INNO 6222	Competing in Dynamic, Innovation-Driven Markets

Entrepreneurship Technological

ENTR 6240	Emerging and Disruptive Technologies
ENTR 6300	Managing a Technology-Based Business
ENTR 6340	The Technical Entrepreneur as Leader

Human Resources Management

HRMG 6280	The Human Side of Innovation

Bouvé College of Health Sciences*Health Informatics*

HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 5300	Personal Health Interface Design and Development
HINF 5301	Evaluating Health Technologies
HINF 6400	Introduction to Health Data Analytics

Nursing

NRSRG 6306	Health Informatics

College of Arts, Media and Design*Communication Studies*

COMM 6605	Youth and Communication Technology

School of Law

LW 6101	Introduction to Legal Studies 1: Law and Legal Reasoning

LW 6102	Introduction to Legal Studies 2
LW 6140	Data Regulation and Compliance
LW 6231	Identifying and Securing Intellectual Property Rights
LW 6232	Intellectual Property and Media
LW 6400	Law, Policy and Legal Argument
LW 7369	Intellectual Property
LW 7669	Law and Technology
College of Social Sciences and Humanities	
<i>Law and Public Policy</i>	
LPSC 7312	Cities, Sustainability, and Climate Change
<i>Philosophy</i>	
PHIL 5005	Information Ethics
<i>Political Science</i>	
POLS 7341	Security and Resilience Policy
POLS 7346	Resilient Cities
<i>Public Policy and Urban Affairs</i>	
PPUA 5262	Big Data for Cities
College of Science	
<i>Physics</i>	
PHYS 5116	Network Science 1

Robotics, MS (Boston)

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics offers instruction by the faculty of the College of Engineering, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences. The program is designed to provide students with comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Biomedical and Rehabilitation Robotics—College of Engineering
- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

Gordon Institute of Engineering Leadership

Master's Degree in Robotics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Robotics in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved robotics technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the certificate coursework may be applied to this program's elective requirements in the coursework option.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Electrical and Computer Engineering		

Complete one of the following:	4

EECE 5550	Mobile Robotics
EECE 5552	Assistive Robotics
EECE 5554	Robotics Sensing and Navigation

Computer Science

Complete one of the following:	4

CS 5180	Reinforcement Learning and Sequential Decision Making
CS 5335	Robotic Science and Systems

Concentrations

Complete one of the following options:

- Biomedical and Rehabilitation Robotics (p. 181)—College of Engineering
- Computer Science (p. 182)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 182)—College of Engineering
- Mechanical Engineering (p. 183)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required (33 total semester hours with participation in co-op in certain concentrations)

Minimum 3.000 GPA required

BIOMEDICAL AND REHABILITATION ROBOTICS CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
Complete one of the following:		4
BIOE 5520	Bioengineering Design for Robotic Rehabilitation	
PT 5170 and PT 5171	Motor Control and Lab for PT 5170	
PT 5321	Applications of Biomechanics in Human Function and Movement	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 183)		
<i>Project Option</i>		
Students working with Department of Physical Therapy, Movement, and Rehabilitation Sciences faculty should enroll in the PT course. Students working with Department of Bioengineering faculty should choose the BIOE course.		
BIOE 7945	Master's Project	
or PT 7995	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p. 183)		
<i>Thesis Option</i>		
Students working with Department of Physical Therapy, Movement, and Rehabilitation Sciences faculty should enroll in the PT course. Students working with Department of Bioengineering faculty should choose the BIOE course.		
BIOE 7945	Master's Project	
or PT 7995	Master's Project	
BIOE 7990	Thesis	
or PT 7990	Thesis	
Complete 8 semester hours of courses from the elective course list. (p. 183)		
Optional Co-op		
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.		
Required Course		
Complete one additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
Options		
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 183)		
<i>Project Option</i>		
CS 8674	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p. 183)		
<i>Thesis Option</i>		
CS 7990	Thesis	
CS 8674	Master's Project	
Complete 8 semester hours of courses from the elective course list. (p. 183)		
Optional Co-op		
For students in the this concentration, please consult your academic advisor for co-op procedures.		

ELECTRICAL AND COMPUTER ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.		
Required Course		
Complete one additional EECE course not used to fulfill the core requirements:		4
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Options		
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 183)		
<i>Project Option</i>		
EECE 7945	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p. 183)		
<i>Thesis Option</i>		
EECE 7945	Master's Project	
EECE 7990	Thesis	
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
Complete 8 semester hours of courses from the elective course list. (p. 183)		
Optional Co-op		
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

MECHANICAL ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Students in the mechanical engineering concentration follow the College of Engineering co-op policies.		
Required Course		

Complete one additional ME course not used to fulfill the core requirements:

4

ME 5250	Robot Mechanics and Control
ME 5659	Control Systems Engineering

Options

Complete one of the following options:

16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

ME 7945 Master's Project

Complete 12 semester hours of courses from the elective course list. (p. 183)

Thesis Option

ME 7945 Master's Project

ME 7990 Thesis

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

Complete the following (students must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Elective Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	

EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
IE 6500	Human Performance
IE 7280	Statistical Methods in Engineering
IE 7315	Human Factors Engineering
IE 7615	Neural Networks and Deep Learning
ME 5240	Computer Aided Design and Manufacturing
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6250	Wearable Robotics
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7247	Advanced Control Engineering
PT 5170	Motor Control
PT 5321	Applications of Biomechanics in Human Function and Movement
PT 7001	Core Concepts in Rehabilitation Science and Research
PT 7005	Experimental Design and Applied Statistics
PT 7020	Technologies in Movement and Rehabilitation Science

Robotics, MS (Seattle)

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics is offered by the College of Engineering and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Electrical and Computer Engineering		
Complete one of the following:		4
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Computer Science		
Complete one of the following:		4

CS 5180	Reinforcement Learning and Sequential Decision Making
CS 5335	Robotic Science and Systems

Concentrations

Complete one of the following concentrations:

- Computer Science (p. 185)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 185)—College of Engineering
- Mechanical Engineering (p. 186)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required (33 total semester hours with participation in co-op in certain concentrations)

Minimum 3.000 GPA required

CONCENTRATION IN COMPUTER SCIENCE

Code	Title	Hours
Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.		
Required Course		
Complete one additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p.)		
<i>Project Option</i>		
CS 8674	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p.)		
<i>Thesis Option</i>		
CS 8674	Master's Project	
CS 7990	Thesis	
Complete 8 semester hours of courses from the elective course list. (p.)		
Optional Co-op		
For students in the this concentration, please consult your academic advisor for co-op procedures.		

CONCENTRATION IN ELECTRICAL AND COMPUTER ENGINEERING

Code	Title	Hours
Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.		
Required Course		
Complete one additional EECE course not used to fulfill the core requirements:		4
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p.)		
<i>Project Option</i>		
EECE 7945	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p.)		
<i>Thesis Option</i>		
EECE 7945	Master's Project	
EECE 7990	Thesis	
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
Complete 8 semester hours of courses from the elective course list. (p.)		

Optional Co-op

Complete the following (students in EECE and MIE concentrations must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

CONCENTRATION IN MECHANICAL ENGINEERING

Code	Title	Hours

Students in the mechanical engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional ME course not used to fulfill the core requirements: 4

ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	

Complete one of the following options: 16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p.)

Project Option

ME 7945 Master's Project

Complete 12 semester hours of courses from the elective course list. (p.)

Thesis Option

ME 7945 Master's Project

ME 7990 Thesis

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p.)

Optional Co-op

Complete the following (students in EECE and MIE concentrations must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Elective Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
DS 5220	Supervised Machine Learning and Learning Theory	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	

EECE 5554	Robotics Sensing and Navigation
EECE 5580	Classical Control Systems
EECE 5639	Computer Vision
EECE 5642	Data Visualization
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7150	Autonomous Field Robotics
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
IE 6500	Human Performance
IE 7280	Statistical Methods in Engineering
IE 7315	Human Factors Engineering
IE 7615	Neural Networks and Deep Learning
ME 5240	Computer Aided Design and Manufacturing
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7247	Advanced Control Engineering

Statistics, MS (Boston)

The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The Master of Science in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouv  College of Health Sciences
- Statistical machine learning—Khoury College of Computer Sciences
- Statistical theory and modeling—College of Science

Students will follow all policies associated with their home college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800	Causal Inference in Public Health Research	3-4

or PHTH 6801	Causal Inference 1	
PHTH 6830	Generalized Linear Models	4

Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 188)—Bouvé College of Health Sciences
- Statistical Machine Learning (p. 188)—Khoury College of Computer Sciences
- Statistical Theory and Modeling (p. 188)—College of Science

Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses may be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

Program Credit/GPA Requirements

31 total semester hours required (32 for students who declare the Concentration in Statistical Theory and Modeling and also opt to participate in co-op)

Minimum 3.000 GPA required

CONCENTRATION IN BIOSTATISTICS (BOUVÉ COLLEGE OF HEALTH SCIENCES)

Code	Title	Hours
Complete 12 semester hours from the following:		12
PHTH 5350	Using SAS in Public Health Research	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	
Optional Co-op		
HLTH 6964	Co-op Work Experience	0

CONCENTRATION IN STATISTICAL MACHINE LEARNING (KHOURY COLLEGE OF COMPUTER SCIENCES)

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Essentials of Data Science	4
Optional Co-op		
CS 6964	Co-op Work Experience	0

CONCENTRATION IN STATISTICAL THEORY AND MODELING (COLLEGE OF SCIENCE)

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
Optional Co-op		
EESC 6500	Pathways to Professional Success	1
EESC 6964	Co-op Work Experience	0

Statistics, MS—Connect (Boston)

The Master of Science in Statistics—Connect program is designed for students from all backgrounds with a BS/BA degree, provided the student has experience with basic calculus and statistics. The first semester of the degree program provides students with the foundational knowledge needed to study successfully alongside direct-entry graduate students. The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The MS in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouv  College of Health Sciences
- Statistical Machine Learning—Khoury College of Computer Sciences
- Statistical Theory and Modeling—College of Science

Students will follow all policies associated with their college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Connect Courses

Code	Title	Hours
Students are required to complete 8–10 semester hours from the following unless otherwise determined by the program:		8-10
CS 5001	Intensive Foundations of Computer Science	
MATH 5001	Accelerated Linear Algebra	
MATH 5002	Accelerated Multivariable Calculus	
MATH 5003	Accelerated Probability and Statistics	
MATH 5110	Applied Linear Algebra and Matrix Analysis	

Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

Concentrations

Complete one of the following concentrations:

- Biostatistics—Bouv  College of Health Sciences (p. 190)
- Statistical Machine Learning—Khoury College of Computer Sciences (p. 190)
- Statistical Theory and Modeling—College of Science (p. 190)

Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses can be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

Program Credit/GPA Requirements

39-41 total semester hours required (40-42 for students who declare the Concentration in Statistical Theory and Modeling and also opt to participate in co-op)

Minimum 3.000 GPA required

BIostatistics Concentration—Bouv  College of Health Sciences

Code	Title	Hours
Complete 12 semester hours from the following:		12
PTH 5350	Using SAS in Public Health Research	
PTH 6440	Advanced Methods in Biostatistics	
PTH 6802	Causal Inference 2	
PTH 6810	Survival Analysis	
PTH 6820	Design and Analysis of Clinical Trials	
Optional Co-op		
HLTH 6964	Co-op Work Experience	0

Statistical Machine Learning Concentration—Khouri College of Computer Sciences

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Essentials of Data Science	4
Optional Co-op		
CS 6964	Co-op Work Experience	0

Statistical Theory and Modeling Concentration—College of Science

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
Optional Co-op		
EESC 6500	Pathways to Professional Success	1
EESC 6964	Co-op Work Experience	0

Computer Science, MSCS (Arlington)

Northeastern University's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling you to increase your broad-based knowledge in the field while allowing you to delve deeper in specific areas through elective courses.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khouri College of Computer Sciences (or affiliated to Khouri).
3. At least one member who is at “arm's length” from the particular work in the thesis. This means that there should be at least one member who isn't a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 115).

Core Requirements

Code	Title	Hours
CS 5010 and CS 5011	Programming Design Paradigm and Recitation for CS 5010	4
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Complete 12 semester hours from two of the following breadth areas:		12

Artificial Intelligence and Data Science

CS 5100	Foundations of Artificial Intelligence
CS 5150	Game Artificial Intelligence
CS 5200	Database Management Systems
CS 5330	Pattern Recognition and Computer Vision
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 6240	Large-Scale Parallel Data Processing
CS 7140	Advanced Machine Learning

Systems and Software

CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5520	Mobile Application Development
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5850	Building Game Engines
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6620	Fundamentals of Cloud Computing

Theory and Security

CS 6760	Privacy, Security, and Usability
CS 7805	Complexity Theory
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12

CS 5097	Mixed Reality
CS 5100 to CS 7980	
CS 7990	Thesis
CS 8674	Master's Project
CS 8982	Readings
CY 5001	Cybersecurity: Technologies, Threats, and Defenses
CY 5010	Cybersecurity Principles and Practices
CY 5130	Computer System Security
CY 5210	Information System Forensics
CY 6120	Software Security Practices

DS 5110	Essentials of Data Science
DS 5230	Unsupervised Machine Learning and Data Mining

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS (Boston)

Northeastern University's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling you to increase your broad-based knowledge in the field while allowing you to delve deeper in specific areas through elective courses.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at “arm’s length” from the particular work in the thesis. This means that there should be at least one member who isn’t a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Gordon Institute of Engineering Leadership

For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the GIEL certificate coursework may be applied to the elective requirements of the program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 113).

Core Requirements

Code	Title	Hours
Programming		
CS 5010 and CS 5011	Programming Design Paradigm and Recitation for CS 5010	4
Algorithms		
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Complete three courses from two of the following breadth areas:		12
Artificial Intelligence and Data Science		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7140	Advanced Machine Learning	
Systems and Software		
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	

CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5850	Building Game Engines
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
Theory and Security	
CS 6760	Privacy, Security, and Usability
CS 7805	Complexity Theory
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CS 5097	Mixed Reality	
CS 5100 to CS 7980		
CS 7990	Thesis	
CS 8674	Master's Project	
CS 8982	Readings	
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	
CY 5010	Cybersecurity Principles and Practices	
CY 5130	Computer System Security	
CY 5210	Information System Forensics	
CY 6120	Software Security Practices	
DS 5110	Essentials of Data Science	
DS 5230	Unsupervised Machine Learning and Data Mining	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS (Miami)

Northeastern University's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling you to increase your broad-based knowledge in the field while allowing you to delve deeper in specific areas through elective courses.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at “arm’s length” from the particular work in the thesis. This means that there should be at least one member who isn’t a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 113).

Core Requirements

Code	Title	Hours
Programming		
CS 5010	Programming Design Paradigm	4
Algorithms		
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Complete three courses from two of the following breadth areas:		12
<i>Artificial Intelligence and Data Science</i>		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7140	Advanced Machine Learning	
<i>Systems and Software</i>		
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6650	Building Scalable Distributed Systems	
<i>Theory and Security</i>		
CS 6760	Privacy, Security, and Usability	
CS 7805	Complexity Theory	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CS 5097	Mixed Reality	
CS 5100 to CS 7980		
CS 7990	Thesis	
CS 8674	Master's Project	
CS 8982	Readings	
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	
CY 5010	Cybersecurity Principles and Practices	
CY 5130	Computer System Security	
CY 5210	Information System Forensics	
CY 6120	Software Security Practices	
DS 5110	Essentials of Data Science	
DS 5230	Unsupervised Machine Learning and Data Mining	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Computer Science, MSCS (Oakland)

Northeastern University's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling you to increase your broad-based knowledge in the field while allowing you to delve deeper in specific areas through elective courses.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at "arm's length" from the particular work in the thesis. This means that there should be at least one member who isn't a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 115).

Core Requirements

Code	Title	Hours
Programming		
CS 5010 and CS 5011	Programming Design Paradigm and Recitation for CS 5010	4
Algorithms		
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Complete three courses from two of the following breadth areas:		12
<i>Artificial Intelligence and Data Science</i>		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7140	Advanced Machine Learning	
<i>Systems and Software</i>		
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5850	Building Game Engines	

392 Computer Science, MSCS (Portland)

CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
<i>Theory and Security</i>	
CS 6760	Privacy, Security, and Usability
CS 7805	Complexity Theory
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CS 5097	Mixed Reality	
CS 5100 to CS 7980		
CS 7990	Thesis	
CS 8674	Master's Project	
CS 8982	Readings	
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	
CY 5010	Cybersecurity Principles and Practices	
CY 5130	Computer System Security	
CY 5210	Information System Forensics	
CY 6120	Software Security Practices	
DS 5110	Essentials of Data Science	
DS 5230	Unsupervised Machine Learning and Data Mining	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS (Portland)

Northeastern University's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling you to increase your broad-based knowledge in the field while allowing you to delve deeper in specific areas through elective courses.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at "arm's length" from the particular work in the thesis. This means that there should be at least one member who isn't a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 115).

Core Requirements

Code	Title	Hours
Programming		
CS 5010 and CS 5011	Programming Design Paradigm and Recitation for CS 5010	4

Algorithms

CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours

Complete three courses from two of the following breadth areas:

12

Artificial Intelligence and Data Science

CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7140	Advanced Machine Learning	

Systems and Software

CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	

Theory and Security

CS 6760	Privacy, Security, and Usability	
CS 7805	Complexity Theory	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	

Electives

Code	Title	Hours

Complete 12 semester hours from the following:

12

CS 5097	Mixed Reality	
CS 5100 to CS 7980		
CS 7990	Thesis	
CS 8674	Master's Project	
CS 8982	Readings	
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	
CY 5010	Cybersecurity Principles and Practices	
CY 5130	Computer System Security	
CY 5210	Information System Forensics	
CY 6120	Software Security Practices	
DS 5110	Essentials of Data Science	
DS 5230	Unsupervised Machine Learning and Data Mining	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS (Silicon Valley)

Northeastern University's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling you to increase your broad-based knowledge in the field while allowing you to delve deeper in specific areas through elective courses.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at "arm's length" from the particular work in the thesis. This means that there should be at least one member who isn't a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 115).

Core Requirements

Code	Title	Hours
Programming		
CS 5010 and CS 5011	Programming Design Paradigm and Recitation for CS 5010	4
Algorithms		
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Complete three courses from two of the following breadth areas:		12
<i>Artificial Intelligence and Data Science</i>		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7140	Advanced Machine Learning	
<i>Systems and Software</i>		
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5850	Building Game Engines	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	

Theory and Security

CS 6760	Privacy, Security, and Usability
CS 7805	Complexity Theory
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CS 5097	Mixed Reality	
CS 5100 to CS 7980		
CS 7990	Thesis	
CS 8674	Master's Project	
CS 8982	Readings	
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	
CY 5010	Cybersecurity Principles and Practices	
CY 5130	Computer System Security	
CY 5210	Information System Forensics	
CY 6120	Software Security Practices	
DS 5110	Essentials of Data Science	
DS 5230	Unsupervised Machine Learning and Data Mining	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS (Seattle)

Northeastern University's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling you to increase your broad-based knowledge in the field while allowing you to delve deeper in specific areas through elective courses.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at "arm's length" from the particular work in the thesis. This means that there should be at least one member who isn't a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 115).

Core Requirements

Code	Title	Hours
Programming		
CS 5010 and CS 5011	Programming Design Paradigm and Recitation for CS 5010	4
Algorithms		
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Complete three courses from two of the following breadth areas:		12
Artificial Intelligence and Data Science		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7140	Advanced Machine Learning	
Systems and Software		
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5850	Building Game Engines	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
Theory and Security		
CS 6760	Privacy, Security, and Usability	
CS 7805	Complexity Theory	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	

Electives

Code	Title	Hours
Complete 12 semester hours from the breadth area courses and/or the following:		12
CS 5097	Mixed Reality	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5310	Computer Graphics	
CS 5335	Robotic Science and Systems	
CS 5340	Computer/Human Interaction	
CS 5350	Computational Geometry	
CS 5360	Noninteractive Computer Graphics	
CS 5540	Game Programming	
CS 5933	Advanced Computer Science Topics for Teachers	
CS 5934	Introduction to Inclusive Computer Science Teaching	
CS 5963	Topics	
CS 5964	Projects for Professionals	
CS 5965	Engaging with Industry Partners for Rising Professionals	
CS 5976	Directed Study	
CS 6120	Natural Language Processing	
CS 6350	Empirical Research Methods	
CS 6640	Operating Systems Implementation	
CS 6954	Co-op Work Experience - Half-Time	

CS 6955	Co-op Work Experience Abroad - Half-Time
CS 6964	Co-op Work Experience
CS 6965	Co-op Work Experience Abroad
CS 6966	Practicum
CS 6983	Topics in Computer Science
CS 7150	Deep Learning
CS 7170	Seminar in Artificial Intelligence
CS 7180	Special Topics in Artificial Intelligence
CS 7200	Statistical Methods for Computer Science
CS 7240	Principles of Scalable Data Management: Theory, Algorithms, and Database Systems
CS 7250	Information Visualization: Theory and Applications
CS 7260	Visualization for Network Science
CS 7270	Seminar in Database Systems
CS 7290	Special Topics in Data Science
CS 7295	Special Topics in Data Visualization
CS 7300	Empirical Research Methods for Human Computer Interaction
CS 7332	Machine Learning with Graphs
CS 7340	Theory and Methods in Human Computer Interaction
CS 7375	Seminar in Human-Computer Interaction
CS 7380	Special Topics in Graphics/Image Processing
CS 7390	Special Topics in Human-Centered Computing
CS 7400	Intensive Principles of Programming Languages
CS 7430	Formal Specification, Verification, and Synthesis
CS 7470	Seminar in Programming Languages
CS 7480	Special Topics in Programming Language
CS 7485	Special Topics in Formal Methods
CS 7575	Seminar in Software Engineering
CS 7580	Special Topics in Software Engineering
CS 7600	Intensive Computer Systems
CS 7610	Foundations of Distributed Systems
CS 7670	Seminar in Computer Systems
CS 7675	Master's Research
CS 7680	Special Topics in Computer Systems
CS 7770	Seminar in Computer Networks
CS 7775	Seminar in Computer Security
CS 7800	Advanced Algorithms
CS 7810	Foundations of Cryptography
CS 7840	Foundations and Applications of Information Theory
CS 7870	Seminar in Theoretical Computer Science
CS 7880	Special Topics in Theoretical Computer Science
CS 7930	Effective Scientific Writing in Computer Science
CS 7980	Research Capstone
CS 7990	Thesis
CS 8674	Master's Project
CS 8982	Readings
CY 5001	Cybersecurity: Technologies, Threats, and Defenses
CY 5010	Cybersecurity Principles and Practices
CY 5130	Computer System Security
CY 5210	Information System Forensics
CY 6120	Software Security Practices
DS 5110	Essentials of Data Science
DS 5230	Unsupervised Machine Learning and Data Mining

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS (Vancouver)

Northeastern University's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling you to increase your broad-based knowledge in the field while allowing you to delve deeper in specific areas through elective courses.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at “arm’s length” from the particular work in the thesis. This means that there should be at least one member who isn’t a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 113).

Core Requirements

Code	Title	Hours
CS 5010 and CS 5011	Programming Design Paradigm and Recitation for CS 5010	4
CS 5800	Algorithms	4
CS 7980	Research Capstone	4

Breadth Areas

Code	Title	Hours
Complete three courses from two of the following breadth areas:		12

Artificial Intelligence and Data Science

CS 5100	Foundations of Artificial Intelligence
CS 5150	Game Artificial Intelligence
CS 5200	Database Management Systems
CS 5330	Pattern Recognition and Computer Vision
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 6240	Large-Scale Parallel Data Processing
CS 7140	Advanced Machine Learning

Systems and Software

CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5520	Mobile Application Development
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 6410	Compilers
CS 6510	Advanced Software Development

CS 6650	Building Scalable Distributed Systems
<i>Theory and Security</i>	
CS 6760	Privacy, Security, and Usability
CS 7805	Complexity Theory
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security

Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8
CS 5097	Mixed Reality	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5310	Computer Graphics	
CS 5335	Robotic Science and Systems	
CS 5340	Computer/Human Interaction	
CS 5350	Computational Geometry	
CS 5360	Noninteractive Computer Graphics	
CS 5540	Game Programming	
CS 5963	Topics	
CS 5964	Projects for Professionals	
CS 5976	Directed Study	
CS 6130	Affective Computing	
CS 6350	Empirical Research Methods	
CS 6640	Operating Systems Implementation	
CS 6954	Co-op Work Experience - Half-Time	
CS 6955	Co-op Work Experience Abroad - Half-Time	
CS 6964	Co-op Work Experience	
CS 6965	Co-op Work Experience Abroad	
CS 6983	Topics in Computer Science	
CS 7150	Deep Learning	
CS 7170	Seminar in Artificial Intelligence	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7240	Principles of Scalable Data Management: Theory, Algorithms, and Database Systems	
CS 7250	Information Visualization: Theory and Applications	
CS 7260	Visualization for Network Science	
CS 7270	Seminar in Database Systems	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
CS 7295	Special Topics in Data Visualization	
CS 7300	Empirical Research Methods for Human Computer Interaction	
CS 7332	Machine Learning with Graphs	
CS 7340	Theory and Methods in Human Computer Interaction	
CS 7375	Seminar in Human-Computer Interaction	
CS 7380	Special Topics in Graphics/Image Processing	
CS 7400	Intensive Principles of Programming Languages	
CS 7430	Formal Specification, Verification, and Synthesis	
CS 7470	Seminar in Programming Languages	
CS 7480	Special Topics in Programming Language	
CS 7485	Special Topics in Formal Methods	
CS 7575	Seminar in Software Engineering	
CS 7580	Special Topics in Software Engineering	

CS 7600	Intensive Computer Systems
CS 7680	Special Topics in Computer Systems
CS 7610	Foundations of Distributed Systems
CS 7670	Seminar in Computer Systems
CS 7675	Master's Research
CS 7680	Special Topics in Computer Systems
CS 7770	Seminar in Computer Networks
CS 7775	Seminar in Computer Security
CS 7800	Advanced Algorithms
CS 7805	Complexity Theory
CS 7810	Foundations of Cryptography
CS 7840	Foundations and Applications of Information Theory
CS 7870	Seminar in Theoretical Computer Science
CS 7880	Special Topics in Theoretical Computer Science
CS 7990	Thesis
CS 8674	Master's Project
CS 8982	Readings
CY 5001	Cybersecurity: Technologies, Threats, and Defenses
CY 5010	Cybersecurity Principles and Practices
CY 5130	Computer System Security
CY 6120	Software Security Practices
DS 5110	Essentials of Data Science
DS 5230	Unsupervised Machine Learning and Data Mining

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS—Align (Arlington)

Master of Science in Computer Science—Align students come from a wide variety of backgrounds, with undergraduate majors including math, biology, history, engineering, and classics. The program begins with a two-semester introductory sequence, which provides the foundational knowledge for students from nontechnical backgrounds to succeed. Students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at arm's length from the particular work in the thesis. This means that there should be at least one member who isn't a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Align Bridge Coursework

Students are required to take all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Object-Oriented Design		
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
Additional ALIGN courses		
CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

Core Requirement

Code	Title	Hours
Algorithms		
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Complete 12 semester hours from two of the following breadth areas:		
Artificial Intelligence and Data Science		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7140	Advanced Machine Learning	
Systems and Software		
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5850	Building Game Engines	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6620	Fundamentals of Cloud Computing	
Theory and Security		
CS 6760	Privacy, Security, and Usability	
CS 7805	Complexity Theory	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CS 5097	Mixed Reality	
CS 5100 to CS 7980		
CS 7990	Thesis	

CS 8674	Master's Project
CS 8982	Readings
CY 5001	Cybersecurity: Technologies, Threats, and Defenses
CY 5010	Cybersecurity Principles and Practices
CY 5130	Computer System Security
CY 5210	Information System Forensics
CY 6120	Software Security Practices
DS 5110	Essentials of Data Science
DS 5230	Unsupervised Machine Learning and Data Mining

Program Credit/GPA Requirements

36–44 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS—Align (Boston)

Master of Science in Computer Science—Align students come from a wide variety of backgrounds, with undergraduate majors including math, biology, history, engineering, and classics. The program begins with a two-semester introductory sequence, which provides the foundational knowledge for students from nontechnical backgrounds to succeed. Students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury (or affiliated to Khoury).
3. At least one member who is at “arm’s length” from the particular work in the thesis. This means that there should be at least one member who isn’t a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Align Bridge Coursework

Students are required to take all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Object-Oriented Design		
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
Additional ALIGN courses		
CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

Core Requirements

Code	Title	Hours
Algorithms		
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Select three courses from two of the three following breadth areas:		12
Artificial Intelligence and Data Science		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7140	Advanced Machine Learning	
Systems and Software		
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5850	Building Game Engines	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
Theory and Security		
CS 6760	Privacy, Security, and Usability	
CS 7805	Complexity Theory	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CS 5097	Mixed Reality	
CS 5100 to CS 7980		
CS 7990	Thesis	
CS 8674	Master's Project	
CS 8982	Readings	
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	
CY 5010	Cybersecurity Principles and Practices	
CY 5130	Computer System Security	
CY 5210	Information System Forensics	
CY 6120	Software Security Practices	
DS 5110	Essentials of Data Science	
DS 5230	Unsupervised Machine Learning and Data Mining	

Program Credit/GPA Requirements

36-44 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS—Align (Miami)

Master of Science in Computer Science—Align students come from a wide variety of backgrounds, with undergraduate majors including math, biology, history, engineering, and classics. The program begins with a two-semester introductory sequence, which provides the foundational knowledge for students from nontechnical backgrounds to succeed. Students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at “arm’s length” from the particular work in the thesis. This means that there should be at least one member who isn’t a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Align Bridge Coursework

Students are required to take all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Object-Oriented Design		
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
Additional ALIGN courses		
CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

Core Requirements

Code	Title	Hours
Algorithms		
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Select three courses from two of the three following breadth areas:		12
Artificial Intelligence and Data Science		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7140	Advanced Machine Learning	

Systems and Software

CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5520	Mobile Application Development
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6650	Building Scalable Distributed Systems

Theory and Security

CS 6760	Privacy, Security, and Usability
CS 7805	Complexity Theory
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CS 5097	Mixed Reality	
CS 5100 to CS 7980		
CS 7990	Thesis	
CS 8674	Master's Project	
CS 8982	Readings	
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	
CY 5010	Cybersecurity Principles and Practices	
CY 5130	Computer System Security	
CY 5210	Information System Forensics	
CY 6120	Software Security Practices	
DS 5110	Essentials of Data Science	
DS 5230	Unsupervised Machine Learning and Data Mining	

Program Credit/GPA Requirements

36-44 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS—Align (Oakland)

Master of Science in Computer Science—Align students come from a wide variety of backgrounds, with undergraduate majors including math, biology, history, engineering, and classics. The program begins with a two-semester introductory sequence, which provides the foundational knowledge for students from nontechnical backgrounds to succeed. Students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at "arm's length" from the particular work in the thesis. This means that there should be at least one member who isn't a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Align Bridge Coursework

Students are required to take all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Object-Oriented Design		
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
Additional ALIGN courses		
CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

Core Requirements

Code	Title	Hours
Algorithms		
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Select three courses from two of the three following breadth areas:		12
Artificial Intelligence and Data Science		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7140	Advanced Machine Learning	
Systems and Software		
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5850	Building Game Engines	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
Theory and Security		
CS 6760	Privacy, Security, and Usability	
CS 7805	Complexity Theory	

CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CS 5097	Mixed Reality	
CS 5100 to CS 7980		
CS 7990	Thesis	
CS 8674	Master's Project	
CS 8982	Readings	
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	
CY 5010	Cybersecurity Principles and Practices	
CY 5130	Computer System Security	
CY 5210	Information System Forensics	
CY 6120	Software Security Practices	
DS 5110	Essentials of Data Science	
DS 5230	Unsupervised Machine Learning and Data Mining	

Program Credit/GPA Requirements

36-44 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS—Align (Portland)

Master of Science in Computer Science—Align students come from a wide variety of backgrounds, with undergraduate majors including math, biology, history, engineering, and classics. The program begins with a two-semester introductory sequence, which provides the foundational knowledge for students from nontechnical backgrounds to succeed. Students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at “arm’s length” from the particular work in the thesis. This means that there should be at least one member who isn’t a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Align Bridge Coursework

Students are required to take all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Object-Oriented Design		

CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4

Additional ALIGN courses

CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

Core Requirements

Code	Title	Hours
Algorithms		
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Select three courses from two of the three following breadth areas:		12

Artificial Intelligence and Data Science

CS 5100	Foundations of Artificial Intelligence
CS 5150	Game Artificial Intelligence
CS 5200	Database Management Systems
CS 5330	Pattern Recognition and Computer Vision
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 6240	Large-Scale Parallel Data Processing
CS 7140	Advanced Machine Learning

Systems and Software

CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5520	Mobile Application Development
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5850	Building Game Engines
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems

Theory and Security

CS 6760	Privacy, Security, and Usability
CS 7805	Complexity Theory
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CS 5097	Mixed Reality	
CS 5100 to CS 7980		
CS 7990	Thesis	
CS 8674	Master's Project	
CS 8982	Readings	
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	
CY 5010	Cybersecurity Principles and Practices	
CY 5130	Computer System Security	
CY 5210	Information System Forensics	

CY 6120	Software Security Practices
DS 5110	Essentials of Data Science
DS 5230	Unsupervised Machine Learning and Data Mining

Program Credit/GPA Requirements

36-44 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS—Align (Seattle)

Master of Science in Computer Science—Align students come from a wide variety of backgrounds, with undergraduate majors including math, biology, history, engineering, and classics. The program begins with a two-semester introductory sequence, which provides the foundational knowledge for students from nontechnical backgrounds to succeed. Students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at “arm’s length” from the particular work in the thesis. This means that there should be at least one member who isn’t a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 115).

Align Bridge Coursework

Students are required to take all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Object-Oriented Design		
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
Additional Align Courses		
CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

Core Requirements

Code	Title	Hours
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Complete three courses from two of the following breath areas:		12

Artificial Intelligence and Data Science

CS 5100	Foundations of Artificial Intelligence

CS 5150	Game Artificial Intelligence
CS 5200	Database Management Systems
CS 5330	Pattern Recognition and Computer Vision
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 6240	Large-Scale Parallel Data Processing
CS 7140	Advanced Machine Learning

Systems and Software

CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5520	Mobile Application Development
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5850	Building Game Engines
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems

Theory and Security

CS 6760	Privacy, Security, and Usability
CS 7805	Complexity Theory
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security

Electives

Code	Title	Hours
Complete 12 semester hours from the breadth area courses and/or the following:		12
CS 5097	Mixed Reality	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5310	Computer Graphics	
CS 5335	Robotic Science and Systems	
CS 5340	Computer/Human Interaction	
CS 5350	Computational Geometry	
CS 5360	Noninteractive Computer Graphics	
CS 5540	Game Programming	
CS 5933	Advanced Computer Science Topics for Teachers	
CS 5934	Introduction to Inclusive Computer Science Teaching	
CS 5963	Topics	
CS 5964	Projects for Professionals	
CS 5965	Engaging with Industry Partners for Rising Professionals	
CS 5976	Directed Study	
CS 6120	Natural Language Processing	
CS 6350	Empirical Research Methods	
CS 6640	Operating Systems Implementation	
CS 6954	Co-op Work Experience - Half-Time	
CS 6955	Co-op Work Experience Abroad - Half-Time	
CS 6964	Co-op Work Experience	
CS 6965	Co-op Work Experience Abroad	
CS 6966	Practicum	
CS 6983	Topics in Computer Science	

CS 7150	Deep Learning
CS 7170	Seminar in Artificial Intelligence
CS 7180	Special Topics in Artificial Intelligence
CS 7200	Statistical Methods for Computer Science
CS 7240	Principles of Scalable Data Management: Theory, Algorithms, and Database Systems
CS 7250	Information Visualization: Theory and Applications
CS 7260	Visualization for Network Science
CS 7270	Seminar in Database Systems
CS 7290	Special Topics in Data Science
CS 7295	Special Topics in Data Visualization
CS 7300	Empirical Research Methods for Human Computer Interaction
CS 7332	Machine Learning with Graphs
CS 7340	Theory and Methods in Human Computer Interaction
CS 7375	Seminar in Human-Computer Interaction
CS 7380	Special Topics in Graphics/Image Processing
CS 7390	Special Topics in Human-Centered Computing
CS 7400	Intensive Principles of Programming Languages
CS 7430	Formal Specification, Verification, and Synthesis
CS 7470	Seminar in Programming Languages
CS 7480	Special Topics in Programming Language
CS 7485	Special Topics in Formal Methods
CS 7575	Seminar in Software Engineering
CS 7580	Special Topics in Software Engineering
CS 7600	Intensive Computer Systems
CS 7610	Foundations of Distributed Systems
CS 7670	Seminar in Computer Systems
CS 7675	Master's Research
CS 7680	Special Topics in Computer Systems
CS 7770	Seminar in Computer Networks
CS 7775	Seminar in Computer Security
CS 7800	Advanced Algorithms
CS 7810	Foundations of Cryptography
CS 7840	Foundations and Applications of Information Theory
CS 7870	Seminar in Theoretical Computer Science
CS 7880	Special Topics in Theoretical Computer Science
CS 7930	Effective Scientific Writing in Computer Science
CS 7980	Research Capstone
CS 7990	Thesis
CS 8674	Master's Project
CS 8982	Readings
CY 5001	Cybersecurity: Technologies, Threats, and Defenses
CY 5010	Cybersecurity Principles and Practices
CY 5130	Computer System Security
CY 5210	Information System Forensics
CY 6120	Software Security Practices
DS 5110	Essentials of Data Science
DS 5230	Unsupervised Machine Learning and Data Mining

Program Credit/GPA Requirements

36-44 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS—Align (Silicon Valley)

Master of Science in Computer Science—Align students come from a wide variety of backgrounds, with undergraduate majors including math, biology, history, engineering, and classics. The program begins with a two-semester introductory sequence, which provides the foundational knowledge for students from nontechnical backgrounds to succeed. Students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at “arm’s length” from the particular work in the thesis. This means that there should be at least one member who isn’t a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Align Bridge Coursework

Students are required to take all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Object-Oriented Design		
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
Additional ALIGN courses		
CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

Core Requirements

Code	Title	Hours
Algorithms		
CS 5800	Algorithms	4

Breadth Areas

Code	Title	Hours
Select three courses from two of the three following breadth areas:		12
Artificial Intelligence and Data Science		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	

CS 7140	Advanced Machine Learning
Systems and Software	
CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5520	Mobile Application Development
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5850	Building Game Engines
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
Theory and Security	
CS 6760	Privacy, Security, and Usability
CS 7805	Complexity Theory
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CS 5097	Mixed Reality	
CS 5100 to CS 7980		
CS 7990	Thesis	
CS 8674	Master's Project	
CS 8982	Readings	
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	
CY 5010	Cybersecurity Principles and Practices	
CY 5130	Computer System Security	
CY 5210	Information System Forensics	
CY 6120	Software Security Practices	
DS 5110	Essentials of Data Science	
DS 5230	Unsupervised Machine Learning and Data Mining	

Program Credit/GPA Requirements

36-44 total semester hours required

Minimum 3.000 GPA required

Computer Science, MSCS—Align (Vancouver)

Master of Science in Computer Science—Align students come from a wide variety of backgrounds, with undergraduate majors including math, biology, history, engineering, and classics. The program begins with a two-semester introductory sequence, which provides the foundational knowledge for students from nontechnical backgrounds to succeed. Students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

MS Thesis Committee

The MS thesis committee must satisfy the following conditions:

1. A total of three members, including the advisor.
2. Two members from Khoury College of Computer Sciences (or affiliated to Khoury).
3. At least one member who is at "arm's length" from the particular work in the thesis. This means that there should be at least one member who isn't a co-advisor on the thesis.
4. External members are allowed but not required.

More members (internal or external) can be added as readers to the committee, so long as the above minimum requirements are fulfilled.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Align Bridge Coursework

Students are required to take all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Object-Oriented Design		
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
Additional ALIGN courses		
CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

Core Requirements

Code	Title	Hours
CS 5800	Algorithms	4
CS 7980	Research Capstone	4

Breadth Areas

Code	Title	Hours
Select three courses from two of the three following breadth areas:		12
Artificial Intelligence and Data Science		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 7140	Advanced Machine Learning	
Systems and Software		
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6650	Building Scalable Distributed Systems	
Theory and Security		
CS 6760	Privacy, Security, and Usability	
CS 7805	Complexity Theory	

CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security

Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8
CS 5097	Mixed Reality	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5310	Computer Graphics	
CS 5335	Robotic Science and Systems	
CS 5340	Computer/Human Interaction	
CS 5350	Computational Geometry	
CS 5360	Noninteractive Computer Graphics	
CS 5540	Game Programming	
CS 5963	Topics	
CS 5964	Projects for Professionals	
CS 5976	Directed Study	
CS 6130	Affective Computing	
CS 6350	Empirical Research Methods	
CS 6640	Operating Systems Implementation	
CS 6954	Co-op Work Experience - Half-Time	
CS 6955	Co-op Work Experience Abroad - Half-Time	
CS 6964	Co-op Work Experience	
CS 6965	Co-op Work Experience Abroad	
CS 6983	Topics in Computer Science	
CS 7150	Deep Learning	
CS 7170	Seminar in Artificial Intelligence	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7240	Principles of Scalable Data Management: Theory, Algorithms, and Database Systems	
CS 7250	Information Visualization: Theory and Applications	
CS 7260	Visualization for Network Science	
CS 7270	Seminar in Database Systems	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
CS 7295	Special Topics in Data Visualization	
CS 7300	Empirical Research Methods for Human Computer Interaction	
CS 7332	Machine Learning with Graphs	
CS 7340	Theory and Methods in Human Computer Interaction	
CS 7375	Seminar in Human-Computer Interaction	
CS 7380	Special Topics in Graphics/Image Processing	
CS 7400	Intensive Principles of Programming Languages	
CS 7430	Formal Specification, Verification, and Synthesis	
CS 7470	Seminar in Programming Languages	
CS 7480	Special Topics in Programming Language	
CS 7485	Special Topics in Formal Methods	
CS 7575	Seminar in Software Engineering	
CS 7580	Special Topics in Software Engineering	
CS 7600	Intensive Computer Systems	
CS 7680	Special Topics in Computer Systems	
CS 7610	Foundations of Distributed Systems	
CS 7670	Seminar in Computer Systems	

CS 7675	Master's Research
CS 7680	Special Topics in Computer Systems
CS 7770	Seminar in Computer Networks
CS 7775	Seminar in Computer Security
CS 7800	Advanced Algorithms
CS 7805	Complexity Theory
CS 7810	Foundations of Cryptography
CS 7840	Foundations and Applications of Information Theory
CS 7870	Seminar in Theoretical Computer Science
CS 7880	Special Topics in Theoretical Computer Science
CS 7990	Thesis
CS 8674	Master's Project
CS 8982	Readings
CY 5001	Cybersecurity: Technologies, Threats, and Defenses
CY 5010	Cybersecurity Principles and Practices
CY 5130	Computer System Security
CY 6120	Software Security Practices
DS 5110	Essentials of Data Science
DS 5230	Unsupervised Machine Learning and Data Mining

Program Credit/GPA Requirements

36-44 total semester hours required

Minimum 3.000 GPA required

Computer Science, Graduate Certificate (Boston)

The postbaccalaureate certificate is designed to give students a solid foundation in the mathematical and theoretical underpinnings of computer science, including the areas of discrete mathematics, basic programming, data structures, object-oriented programming, algorithms, and computer systems. The goal of the certificate is to provide foundational knowledge in computer science that is valuable in both the workplace for career advancement, as well as to those looking to move into graduate programs within the discipline.

The courses in the Postbaccalaureate Certificate in Computer Science will serve as the foundational premaster's courses in the Align program. Students that successfully complete the five certificate courses with a B in each course or better will be eligible to matriculate into the Master of Science in Computer Science program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
CS 5002	Discrete Structures	4
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Data Analytics, Graduate Certificate (Boston)

The interdisciplinary Graduate Certificate in Data Analytics is offered through a collaboration between the Khoury College of Computer Sciences and the College of Social Sciences and Humanities. The certificate curriculum emphasizes the skills needed to bridge between emerging technological capacities and traditional policymaking processes. The program is designed to provide students with foundational knowledge in data science—

including data management, machine learning, data mining, statistics, and visualizing and communicating data—that can be applied to data-driven decision making in any discipline.

For more information on the certificate, refer to the program's website (<https://www.northeastern.edu/graduate/program/graduate-certificate-in-data-analytics-boston-14423/>).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Inclusive Computer Science Education, Graduate Certificate (Portland)

Overview

The Graduate Certificate in Inclusive Computer Science Education is designed to prepare students to teach computer science principles and concepts in the context of a K–12 environment. Building on the successful Computer Science—Align program, this certificate assumes no prior computer science experience. Through coursework and project-based learning, students have an opportunity to obtain the foundational knowledge necessary to teach basic computing concepts and programming at a variety of educational levels both as stand-alone courses and integrated into other disciplines. The certificate emphasizes how teachers can create an inclusive classroom environment, actively work to dispel stereotypes, and build student confidence. Students who finish this certificate will be well positioned to obtain K–12 certification in computer science.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CS 5001	Intensive Foundations of Computer Science	4
CS 5002	Discrete Structures	4
CS 5933	Advanced Computer Science Topics for Teachers	4
CS 5934	Introduction to Inclusive Computer Science Teaching	4

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Cybersecurity

Students can apply for admission to two distinct degree programs.

Doctor of Philosophy in Cybersecurity

Offered jointly between Khoury College and the College of Engineering, a research-based, interdisciplinary PhD in cybersecurity spans theory and systems, from hardware to software security, from cryptography to policy, and from malware to wireless security. It seeks to prepare graduates to advance the state of the art of security in systems, networks, and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Master of Science in Cybersecurity

An industry-focused, interdisciplinary Master of Science in Cybersecurity combines knowledge of information security technology and cybersecurity hands-on tools with relevant knowledge from law, the social sciences, criminology, and management. The Master of Science in Cybersecurity is designed for students focused on cybersecurity careers in companies or government agencies, thus applying their knowledge to their workplaces to assess security threats and manage information security risks and technical and policy controls.

Northeastern University designations by the National Security Agency and the Department of Homeland Security:

- NSA/DHS Center of Academic Excellence in Cybersecurity—Cyber Defense Education
- NSA/DHS Center of Academic Excellence in Cybersecurity—Research
- NSA/DHS Center of Academic Excellence in Cybersecurity—Cyber Operations
- NSA National Center of Academic Excellence in Cybersecurity

Align Master of Science in Cybersecurity

Without exception, every organization needs to protect their information system. Every day cyber risks are becoming more complex, and the sophistication and number of threats is growing continuously. For these reasons, cybersecurity professionals need to become more prepared, with a very solid background and with the capacity to evolve and adapt to the current and future information systems challenges.

Organizations are looking for well-rounded cybersecurity professionals who, beside their understanding of information technologies, can also comprehend the many other dimensions that contribute to effective and efficient information systems security. Professionals with diversified backgrounds are particularly interesting because they are able to provide different approaches to complex cybersecurity problems.

Align-MSCY students are perfect cybersecurity professionals, because they have proven their adaptability to the cybersecurity field and also because they bring an invaluable experience and knowledge from other areas to contribute to a global perspective of an organization's cybersecurity posture.

Programs

Doctor of Philosophy (PhD)

- Cybersecurity (Boston) (p. 418)

Master of Science

- Cybersecurity (Arlington) (p. 422)
- Cybersecurity (Boston) (p. 424)
- Cybersecurity—Align (Arlington) (p. 426)
- Cybersecurity—Align (Boston) (p. 428)

Graduate Certificate

- Cybersecurity (Boston) (p. 429)

Cybersecurity, PhD (Boston)

A research-based, interdisciplinary Doctor of Philosophy (PhD) in Cybersecurity combines a strong security technical foundation with a security policy and social sciences perspective. It seeks to prepare graduates to advance the state of the art of security in systems, networks, and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Students who choose the PhD in Cybersecurity program have a strong desire to pursue academic research solving critical cybersecurity challenges facing today's society. The PhD program is a natural path for students in the college's Master of Science in Cybersecurity (<http://www.ccs.neu.edu/graduate/degree-programs/m-s-in-information-assurance/>) program who want to pursue research and students with bachelor's degrees and an interest in research-focused careers. Students who pursue careers in advancing the state of the art of cybersecurity have an opportunity to gain:

- A strong technical foundation in cybersecurity and an interdisciplinary perspective based on policy and social science
- A path to a research-focused career coupled with depth in information assurance research at a leading institution, one of the earliest designees by NSA/DHS as a National Center of Academic Excellence in Information Assurance Research, Information Assurance/Cyber Defense, and Cyber Operations
- The opportunity to work with and learn from faculty who are recognized internationally for their expertise and contributions in information assurance from Northeastern University's Khoury College of Computer Sciences, the Department of Electrical and Computer Engineering, and the College of Social Sciences and Humanities
- Access to research projects at Northeastern's research centers focused on security:
 - The Cybersecurity and Privacy Institute (<https://cyber.ccis.northeastern.edu/about/>): The mission of Northeastern's Cybersecurity and Privacy Institute is to safeguard critical technology. Forging partnerships with experts in industry, government, and academia worldwide, the Institute's faculty and students develop, protect, and enhance technologies on which the world relies—from mobile devices and “smart” IoT applications to tomorrow's self-driving cars and delivery drones. Their expertise spans algorithm auditing; cloud security; cryptography; differential privacy;

embedded device security; internet-scale security measurements; machine learning; big data; security, malware, and advanced threats; network protocols and security; web and mobile security; and wireless network security.

- The International Secure Systems Lab (<http://www.isecslab.org/>), affiliated with Northeastern, a collaborative effort of European and U.S. researchers focused on web security, malware, and vulnerability analysis; intrusion detection; and other computer security issues.
- The ALERT Center (<http://www.northeastern.edu/alert/>), where Northeastern is the lead institution, a multiuniversity Department of Homeland Security Center of Excellence involved in research, education, and technology related to threats from explosives.

The benefits of the Boston area:

- World-renowned for academic and research excellence, the Boston area is also home to some of the nation's largest Department of Defense contractors and government and independent labs such as MIT Lincoln Lab, MITRE, and Draper Lab.

Degree Requirements

The PhD in Cybersecurity degree requires completion of at least 48 semester hours beyond a bachelor's degree. Students who enter with an undergraduate degree will typically need four to five years to complete the program, and they will be awarded a master's degree en route to the PhD.

Doctoral Degree Candidacy

A student is considered a PhD degree candidate after completing the core courses with at least a 3.500 GPA, with no grades lower than a B in the core courses, and either publishing a paper in a strong conference or journal or passing an oral exam that is conducted by a committee of three cybersecurity faculty members and based on paper(s) written by the student.

RESIDENCY

One year of continuous full-time study is required after admission to the PhD candidacy. During this period, the student will be expected to make substantial progress in preparing for the comprehensive examination.

TEACHING REQUIREMENT

All cybersecurity PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment or quiz or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

DISSERTATION ADVISING

The doctoral dissertation advising team for each student consists of two cybersecurity faculty members, one in a technical area. When appropriate, the second faculty advisor will be from the policy/social science area.

DISSERTATION COMMITTEE

With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD cybersecurity curriculum committee. The four members must include the advisor, two internal members, and an external member.

COMPREHENSIVE EXAMINATION

A PhD student must submit a written dissertation proposal and present it to the dissertation committee. The proposal should identify the research problem, the research plan, and the potential impact of the research on the field. The presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee after the public presentation.

DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in cybersecurity.

AWARDING OF MASTER'S DEGREES

Students who enter the PhD in Cybersecurity program with a bachelor's degree have the option of earning a master's degree from one of the departments participating in the program. To do so, they must meet all of the department's degree requirements.

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Teaching
Qualifying exam and area exam
Annual review
Dissertation proposal

Dissertation committee

Dissertation defense

Core Requirements

A grade of B or higher is required in each core course. A cumulative 3.500 grade-point average is required for the core requirement.

Code	Title	Hours
Foundations		
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4
CY 5770	Software Vulnerabilities and Security	4
or EECE 5641	Introduction to Software Security	
CY 6740	Network Security	4
or EECE 5699	Computer Hardware and System Security	

Electives and Tracks

Code	Title	Hours

Note: Consult faculty advisor for other acceptable courses.

Tracks

Select at least two courses from one track: 8

Hardware Security

CS 6410	Compilers	
EECE 5666	Digital Signal Processing	
EECE 7352	Computer Architecture	
EECE 7364	Mobile and Wireless Networking	
EECE 7390	Computer Hardware Security	

Machine Learning

CS 5700	Fundamentals of Computer Networking	
CS 6140	Machine Learning	
CS 7150	Deep Learning	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	

Network Security

CY 6740	Network Security	
CS 7610	Foundations of Distributed Systems	
CS 7775	Seminar in Computer Security	
CY 5130	Computer System Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7336	Digital Communications	
EECE 7364	Mobile and Wireless Networking	
EECE 7374	Fundamentals of Computer Networks	

Systems Security

CS 6410	Compilers	
CS 7600	Intensive Computer Systems	
CS 7610	Foundations of Distributed Systems	
CY 5130	Computer System Security	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
EECE 7352	Computer Architecture	

Theory

CS 7800	Advanced Algorithms	
CS 7805	Complexity Theory	
CS 7810	Foundations of Cryptography	
CS 7870	Seminar in Theoretical Computer Science	
EECE 7337	Information Theory	

Usable Security and Privacy

CS 6350	Empirical Research Methods
CS 6760	Privacy, Security, and Usability
CS 7340	Theory and Methods in Human Computer Interaction
INSH 6300	Research Methods in the Social Sciences
INSH 6302	Qualitative Methods
INSH 6500	Statistical Analysis
INSH 7400	Quantitative Analysis

Cybersecurity Policy

CRIM 6200	Criminology
CRIM 6262	Evidence-Based Crime Policy
CY 5200	Security Risk Management and Assessment
CY 5210	Information System Forensics
CY 5250	Decision Making for Critical Infrastructure
POLS 7341	Security and Resilience Policy

Electives

Selected in consultation with advisor from graduate-level CS and ECE courses and graduate-level courses offered by the College of Social Sciences and Humanities, including CRIM, CS, CY, DS, EECE, INSH, MATH and POLS. 28

Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	

Complete the following (repeatable) course until graduation:

CY 9996	Dissertation Continuation

Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements**Degree Requirements**

Incoming PhD in Cybersecurity students who have already completed a Master of Science in an adjacent field may petition to the graduate program administration for advanced entry. Advanced entry petitions are reviewed by the program administration on a case-by-case basis. Please note that advanced entry does not waive by itself any part of the PhD coursework requirements. As a degree conferral requirement, a minimum of 16 semester hours of coursework beyond the 32 semester hours of the master's degree is required of advanced entry PhD students (48 semester hours is required of standard entry PhD students). A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

Doctoral Degree Candidacy

Refer to the PhD Cybersecurity overview (p. 418) for admission to candidacy requirements.

Residency

Refer to the PhD Cybersecurity overview (p. 418) for residency requirements.

Teaching Requirement

Refer to the PhD Cybersecurity overview (p. 418) for teaching requirements.

Dissertation Advising

Refer to the PhD Cybersecurity overview (p. 418) for dissertation advising requirements.

Dissertation Committee

Refer to the PhD Cybersecurity overview (p. 418) for dissertation committee requirements.

Comprehensive Examination

Refer to the PhD Cybersecurity overview (p. 418) for comprehensive examination requirements.

Dissertation Defense

Refer to the PhD Cybersecurity overview (p. 418) for dissertation defense and completion requirements.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Teaching
Qualifying exam and area exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirement

Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each core course.

Code	Title	Hours
Consult your faculty advisor for approved courses.		16

Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

Program Credit/GPA Requirements

Minimum 16 semester hours required
Minimum 3.000 GPA required

Cybersecurity, MS (Arlington)

Our Master of Science in Cybersecurity combines a solid understanding of information security technology with relevant knowledge from law, the social sciences, criminology, and management. The MS program is designed for working professionals and also recent graduates who want knowledge they can apply in workplaces to assess and manage information security risks effectively.

The cybersecurity program provides graduates with both the theoretical and experimental skills to perform professional cybersecurity duties. Due to the broad variety of positions that cybersecurity professionals may hold in the industry, our curriculum is designed to provide enough flexibility to our students to tailor their own careers appropriately.

The cybersecurity curriculum is intended to provide a comprehensive approach to cybersecurity, which includes both the technical skills and the contextual understanding that are fundamental to cybersecurity professions.

Concentration in Criminology

Cybercrime has evolved into more advanced techniques and sophisticated structures. Cybersecurity professionals are of vital importance in crime investigations, and for that reason, they need to have a well-rounded background and knowledge. The Master of Science in Cybersecurity provides an interdisciplinary foundation that includes computer science technical courses, complemented with the contextual knowledge courses required for a proper holistic approach to cybercrime. The optional concentration in criminology will offer MSCY students an opportunity to obtain the fundamental principles and the most important practices that criminal justice professionals use.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Foundations		
CY 5001	Cybersecurity: Technologies, Threats, and Defenses ¹	4
CY 5010	Cybersecurity Principles and Practices	4
Technical Track		
Complete 8 semester hours from the following:		8
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	

CY 5150	Network Security Practices
CY 5770	Software Vulnerabilities and Security
CY 6120	Software Security Practices
CY 6740	Network Security
CY 6760	Wireless and Mobile Systems Security

Contextual Track

Complete 8 semester hours from the following: 8

CY 5200	Security Risk Management and Assessment
CY 5210	Information System Forensics
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
CY 5250	Decision Making for Critical Infrastructure
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance

Capstone

CY 7900	Capstone Project	4

Electives

Code	Title	Hours

Complete 4 semester hours from the following: 4

CRIM 6200	Criminology
CRIM 6202	The Criminal Justice Process
CRIM 6262	Evidence-Based Crime Policy
CS 5200	Database Management Systems
CS 5500	Foundations of Software Engineering
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 7580	Special Topics in Software Engineering
CS 7805	Complexity Theory
CY 5065	Cloud Security Practices
CY 5120	Applied Cryptography
CY 5130	Computer System Security
CY 5150	Network Security Practices
CY 5200	Security Risk Management and Assessment
CY 5210	Information System Forensics
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
CY 5770	Software Vulnerabilities and Security
CY 6120	Software Security Practices
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance
CY 6740	Network Security
CY 6760	Wireless and Mobile Systems Security
CY 7790	Special Topics in Security and Privacy
POLS 7341	Security and Resilience Policy
PPUA 6503	Managing People in Public and Nonprofit Sectors

Concentration in Criminology

This optional concentration's required courses may count toward the contextual track, and its elective may count toward the major's elective area.

Code	Title	Hours
Required		
CRIM 6200	Criminology	4
CRIM 6202	The Criminal Justice Process	4
Complete one of the following: 4		
CRIM 6262	Evidence-Based Crime Policy	

CY 5250 Decision Making for Critical Infrastructure

CRIM Elective ²**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

¹ A student who demonstrates prior mastery of the learning outcomes for Cybersecurity: Technologies, Threats, and Defenses (CY 5001) may replace the course with elective coursework to meet the semester hours required for the degree. See the electives list for options.

² CRIM elective to be approved by director/associate director of MSCY.

Cybersecurity, MS (Boston)

Our Master of Science in Cybersecurity combines a solid understanding of information security technology with relevant knowledge from law, the social sciences, criminology, and management. The MS program is designed for working professionals and also recent graduates who want knowledge they can apply in workplaces to assess and manage information security risks effectively.

The cybersecurity program provides graduates with both the theoretical and experimental skills to perform professional cybersecurity duties. Due to the broad variety of positions that cybersecurity professionals may hold in the industry, our curriculum is designed to provide enough flexibility to our students to tailor their own careers appropriately.

The cybersecurity curriculum is intended to provide a comprehensive approach to cybersecurity, which includes both the technical skills and the contextual understanding that are fundamental to cybersecurity professions.

Concentration in Criminology

Cybercrime has evolved into more advanced techniques and sophisticated structures. Cybersecurity professionals are of vital importance in crime investigations, and for that reason, they need to have a well-rounded background and knowledge. The Master of Science in Cybersecurity provides an interdisciplinary foundation that includes computer science technical courses, complemented with the contextual knowledge courses required for a proper holistic approach to cybercrime. The optional concentration in criminology will offer MSCY students an opportunity to obtain the fundamental principles and the most important practices that criminal justice professionals use.

Gordon Institute of Engineering Leadership**MASTER'S DEGREE IN CYBERSECURITY WITH GRADUATE CERTIFICATE IN ENGINEERING LEADERSHIP**

Students may complete a Master of Science in Cybersecurity in addition to earning a Graduate Certificate in Engineering Leadership (p. 738).

Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The certificate program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour master's degree and certificate require 24 hours from the Master of Science in Cybersecurity (MS required courses, technical track, and contextual track).

For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours (SH) of the GIEL certificate coursework may be applied to the Capstone and elective requirements of the program.

Program Requirements**Core Requirements**

Code	Title	Hours
Foundations		
CY 5001	Cybersecurity: Technologies, Threats, and Defenses ¹	4
CY 5010	Cybersecurity Principles and Practices	4
Technical Track		
Complete 8 semester hours from the following:		8
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5770	Software Vulnerabilities and Security	
CY 6120	Software Security Practices	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
Contextual Track		
Complete 8 semester hours from the following:		8
CY 5200	Security Risk Management and Assessment	

CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5250	Decision Making for Critical Infrastructure	
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance	
Capstone		
CY 7900	Capstone Project	4

Electives

Code	Title	Hours
Complete 4 semester hours from the following:		4
CRIM 6200	Criminology	
CRIM 6202	The Criminal Justice Process	
CRIM 6262	Evidence-Based Crime Policy	
CS 5200	Database Management Systems	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 7580	Special Topics in Software Engineering	
CS 7805	Complexity Theory	
CY 5065	Cloud Security Practices	
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5770	Software Vulnerabilities and Security	
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
CY 7790	Special Topics in Security and Privacy	
POLS 7341	Security and Resilience Policy	
PPUA 6503	Managing People in Public and Nonprofit Sectors	

Concentration in Criminology

This optional concentration's required courses may count toward the contextual track, and its elective may count toward the major's elective area.

Code	Title	Hours
Required		
CRIM 6200	Criminology	4
CRIM 6202	The Criminal Justice Process	4
Complete one of the following:		4
CRIM 6262	Evidence-Based Crime Policy	
CY 5250	Decision Making for Critical Infrastructure	
CRIM elective ²		

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

¹ A student who demonstrates prior mastery of the learning outcomes for Cybersecurity: Technologies, Threats, and Defenses (CY 5001) may replace the course with elective coursework to meet the semester hours required for the degree. See the electives list for options.

² CRIM elective to be approved by director/associate director of MSCY.

Cybersecurity, MS—Align (Arlington)

The Master of Science in Cybersecurity—Align program is designed for students with a BS/BA degree from all backgrounds. During the first semester of year one, students are expected to take foundational courses in computer science fundamentals, as well as a course in data structures/discrete mathematics. During their second semester, students take coursework in foundations of cybersecurity.

Our Master of Science in Cybersecurity combines a solid understanding of information security technology with relevant knowledge from law and ethics, the social sciences, criminology, and management. The MS program is designed for working professionals and recent graduates who want knowledge they can apply in workplaces to assess and manage information security risks effectively.

The cybersecurity program provides graduates with both the theoretical understanding and technical skills to perform professional cybersecurity duties. Due to the broad variety of positions that cybersecurity professionals may hold in the industry, our curriculum is designed to provide enough flexibility to our students to tailor their own careers appropriately.

The cybersecurity curriculum is intended to provide a comprehensive approach to cybersecurity, which includes both the technical skills and the contextual understanding that are fundamental to cybersecurity professions.

Concentration in Criminology

Cybercrime has evolved into more advanced techniques and sophisticated structures. Cybersecurity professionals are of vital importance in crime investigations, and for that reason, they need to have a well-rounded background and knowledge. The Master of Science in Cybersecurity provides an interdisciplinary foundation that includes computer science technical courses, complemented with the contextual knowledge courses required for a proper holistic approach to cybercrime. The optional concentration in criminology will offer MSCY students an opportunity to obtain the fundamental principles and the most important practices that criminal justice professionals use.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Align Bridge Coursework

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Cybersecurity		
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	4
Additional Align Courses		
CY 5003	Foundations of Software Security	4

Core Requirements

Code	Title	Hours
Foundations		
CY 5010	Cybersecurity Principles and Practices	4
Technical Track		
Complete 8 semester hours from the following:		8
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5770	Software Vulnerabilities and Security	
CY 6120	Software Security Practices	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
Contextual Track		
Complete 8 semester hours from the following:		8
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	

CY 5250	Decision Making for Critical Infrastructure	
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance	
Capstone		
CY 7900	Capstone Project	4

Electives

Code	Title	Hours
Complete 4 semester hours from the following:		4
CRIM 6200	Criminology	
CRIM 6202	The Criminal Justice Process	
CRIM 6262	Evidence-Based Crime Policy	
CS 5200	Database Management Systems	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 7580	Special Topics in Software Engineering	
CS 7805	Complexity Theory	
CY 5065	Cloud Security Practices	
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5770	Software Vulnerabilities and Security	
CY 6120	Software Security Practices	
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
CY 7790	Special Topics in Security and Privacy	
POLS 7341	Security and Resilience Policy	
PPUA 6503	Managing People in Public and Nonprofit Sectors	

Concentration in Criminology

This optional concentration's required courses may count toward the contextual track, and its elective may count toward the major's elective area.

Code	Title	Hours
Required		
CRIM 6200	Criminology	4
CRIM 6202	The Criminal Justice Process	4
Complete one of the following:		4
CRIM 6262	Evidence-Based Crime Policy	
CY 5250	Decision Making for Critical Infrastructure	
CRIM elective ¹		

Program Credit/GPA Requirements

36–44 total semester hours required

Minimum 3.000 GPA required

¹ CRIM elective to be approved by director/associate director of MSCY.

Cybersecurity, MS—Align (Boston)

The Master of Science in Cybersecurity—Align program is designed for students with a BS/BA degree from all backgrounds. During the first semester of year one, students are expected to take foundational courses in computer science fundamentals, as well as a course in data structures/discrete mathematics. During their second semester, students take coursework in foundations of cybersecurity.

Our Master of Science in Cybersecurity combines a solid understanding of information security technology with relevant knowledge from law and ethics, the social sciences, criminology, and management. The MS program is designed for working professionals and recent graduates who want knowledge they can apply in workplaces to assess and manage information security risks effectively.

The cybersecurity program provides graduates with both the theoretical understanding and technical skills to perform professional cybersecurity duties. Due to the broad variety of positions that cybersecurity professionals may hold in the industry, our curriculum is designed to provide enough flexibility to our students to tailor their own careers appropriately.

The cybersecurity curriculum is intended to provide a comprehensive approach to cybersecurity, which includes both the technical skills and the contextual understanding that are fundamental to cybersecurity professions.

Concentration in Criminology

Cybercrime has evolved into more advanced techniques and sophisticated structures. Cybersecurity professionals are of vital importance in crime investigations, and for that reason, they need to have a well-rounded background and knowledge. The Master of Science in Cybersecurity provides an interdisciplinary foundation that includes computer science technical courses, complemented with the contextual knowledge courses required for a proper holistic approach to cybercrime. The optional concentration in criminology will offer MSCY students an opportunity to obtain the fundamental principles and the most important practices that criminal justice professionals use.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Align Bridge Coursework

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Cybersecurity		
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	4
Additional Align Courses		
CY 5003	Foundations of Software Security	4

Core Requirements

Code	Title	Hours
Foundations		
CY 5010	Cybersecurity Principles and Practices	4
Technical Track		
Complete 8 semester hours from the following:		8
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5770	Software Vulnerabilities and Security	
CY 6120	Software Security Practices	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
Contextual Track		
Complete 8 semester hours from the following:		8
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	

CY 5250	Decision Making for Critical Infrastructure	
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance	
Capstone		
CY 7900	Capstone Project	4

Electives

Code	Title	Hours
Complete 4 semester hours from the following:		4
CRIM 6200	Criminology	
CRIM 6202	The Criminal Justice Process	
CRIM 6262	Evidence-Based Crime Policy	
CS 5200	Database Management Systems	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 7580	Special Topics in Software Engineering	
CS 7805	Complexity Theory	
CY 5065	Cloud Security Practices	
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5770	Software Vulnerabilities and Security	
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
CY 7790	Special Topics in Security and Privacy	
POLS 7341	Security and Resilience Policy	
PPUA 6503	Managing People in Public and Nonprofit Sectors	

Concentration in Criminology

This optional concentration's required courses may count toward the contextual track, and its elective may count toward the major's elective area.

Code	Title	Hours
Required		
CRIM 6200	Criminology	4
CRIM 6202	The Criminal Justice Process	4
Complete one of the following:		4
CRIM 6262	Evidence-Based Crime Policy	
CY 5250	Decision Making for Critical Infrastructure	
CRIM elective ¹		

Program Credit/GPA Requirements

36–44 total semester hours required

Minimum 3.000 GPA required

¹ CRIM elective to be approved by director/associate director of MSCY.

Cybersecurity, Graduate Certificate (Boston)

The certificate is designed to give students a solid foundation in cybersecurity. In the course work, students have the opportunity to be exposed to fundamental cybersecurity principles and information security concepts related to information systems, to explore issues involved in the security

of computer systems, and to explore the techniques used in computer forensic examination. The goal of the certificate is to provide prospective cybersecurity professionals with an entry point to industry positions within eight months from admission and with reduced financial investment.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CY 5010	Cybersecurity Principles and Practices	4
CY 5130	Computer System Security	4
CY 5210	Information System Forensics	4

Elective

Code	Title	Hours
Complete one of the following:		4
CY 5150	Network Security Practices	
CY 5200	Security Risk Management and Assessment	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Interdisciplinary Programs

Doctor of Philosophy (PhD)

- Cybersecurity (Boston) (<https://catalog.northeastern.edu/graduate/computer-information-science/cybersecurity/cybersecurity-bachelors-degree-entrance-phd/>)
- Network Science (Boston) (p. 241)
- Personal Health Informatics (Boston) (p. 339)

Master of Science (MS)

- Artificial Intelligence (Boston) (<https://catalog.northeastern.edu/graduate/computer-information-science/computer-science/artificial-intelligence-ms/>)
- Complex Network Analysis (Boston) (<https://catalog.northeastern.edu/graduate/computer-information-science/computer-science/complex-network-analysis-ms/>)
- Data Science (Boston) (p. 169)
- Data Science—Align (Boston) (p. 172)
- Extended Realities (Boston) (p. 175)
- Game Science and Design (Boston) (p. 217)
- Health Informatics (Boston) (p. 447)
- Health Informatics (Vancouver) (p. 450)
- Internet of Things (Boston) (p. 372)
- Robotics (Boston) (p. 180)
- Robotics (Seattle) (p. 184)
- Statistics (Boston) (<https://catalog.northeastern.edu/graduate/computer-information-science/computer-science/statistics-ms/>)
- Statistics—Connect (Boston) (<https://catalog.northeastern.edu/graduate/computer-information-science/computer-science/statistics-ms-connect/#text>)

Graduate Certificate

- Data Analytics (Boston) (p. 416)

Network Science, PhD (Boston)

The PhD in Network Science program aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is a multidisciplinary program, with members of the Northeastern University Network

Science Institute (<https://www.networkscienceinstitute.org/>) representing a range of fields including computer science, information science, physics, complexity, sociology, communication, data visualization, organizational behavior, political science, population health, and epidemiology.

This doctoral program is a joint collaboration across five academic colleges. Students are admitted to the College of Social Sciences and Humanities and may choose to move to the home college of their dissertation advisor after they reach candidacy (once they pass their dissertation proposal/comprehensive exam). Students follow policies of their home college, including dissertation format and submission deadlines for graduation. Faculty supervisors may be from one of the following Northeastern academic colleges:

- College of Science
- College of Social Sciences and Humanities
- Khoury College of Computer Sciences
- Bouvé College of Health Sciences
- College of Arts, Media and Design

Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of elective courses relevant to the student's area of research. Electives should be discussed with the student's faculty advisor. A minimum of 40 semester hours of coursework is required, though the faculty advisor or program committee may recommend additional coursework based on student research skills.

Alternative Course Path

Students have the option to complete core coursework in their first year of study. This curriculum pathway is expected to be taken by students whose admitting advisor is located outside of the Boston campus and elsewhere in the Northeastern network.

Annual Review

A review of satisfactory progress will be ongoing and formally evaluated at the end of each academic year. Students must maintain a cumulative grade-point average of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain a 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for dismissal by the graduate program committee.

As part of the annual review process, the students will be asked to submit a summary of completed and future courses and research. Students will submit to the program committee:

- A list of courses completed in the last academic year and course plan for the following year
- A short synopsis of their research progress and research plans for the next year

Qualifying Examination

The qualifying exam is an hour-long oral examination of the material covered in the core curriculum and consists of questions selected by network science faculty. One month prior to the exam., students receive between 50 to 80 study questions to prepare. Students will be asked to give a short presentation of their research plans, followed by an oral exam where the qualifying exam panel will ask a subset of the review questions.

Students must take the exam by the fall semester of their third year. If students fail the qualifying exam on their first attempt, they may retake the exam in the following semester. Students who do not pass the exam after two attempts will be asked to leave the program.¹

Dissertation Committee

Students must confirm their dissertation advisor by the end of their second year. The dissertation advisor must be a full-time, tenured, tenure-track, research, or teaching faculty member of Northeastern. The advisor should be a network science doctoral program faculty member, unless the student receives approval by the network science program committee.

Students must confirm their dissertation committee prior to their comprehensive exam. The committee must consist of a minimum of four members:

1. A dissertation advisor
2. A core member of the Network Science Institute faculty
3. An additional tenured/tenure-track, research, or teaching faculty member from the Network Science Institute or other Northeastern faculty approved by the advisor and program committee
4. One member recognized as an expert in the specific topic of research, who can be external to Northeastern.

Dissertation Proposal (Comprehensive Examination)

The comprehensive exam should be completed in the student's fourth year of study. The exam consists of two parts: preparation of the dissertation proposal and oral presentation of the proposal. Students must prepare a written comprehensive research proposal describing the dissertation research plan including review of relevant literature, research questions, motivation, methods, any preliminary results, and potential impact. The proposal must be shared with the doctoral committee members two weeks prior to the scheduled presentation.

Students will give a 30-minute oral presentation to their committee members that is open to the public. Following the presentation, the dissertation committee will assess the proposed research plan and provide feedback to the student. If the proposal and/or presentation do not meet the expectations of the committee, the student will be asked to revise their proposal and/or their presentation. The completion of the comprehensive exam

is considered successful if the dissertation committee approves as satisfactory both the written proposal and the oral presentation. Students may repeat the comprehensive exam once. If they are unsuccessful in their second attempt, the program will ask the student to leave the program.

PhD Candidacy

A student is considered a doctoral candidate upon completion of the required coursework with a minimum cumulative GPA of 3.000, a passing score on the qualification exam, and satisfactory completion of the comprehensive exam.

Dissertation

A PhD student should aim to complete their dissertation in their fifth year of study. Upon successful completion of the research plan proposed in the dissertation proposal, the candidate has an opportunity to prepare the dissertation for approval by the dissertation committee. The dissertation must contain results of extensive research and make an original contribution to the field. The work should give evidence of the candidate’s ability to carry out independent research. It is expected that the dissertation consists of one or more research studies of sufficient quality to merit publication in a reputable journal(s).

Dissertation Defense

Like the dissertation proposal, the dissertation defense consists of two parts: the written dissertation and the defense oral presentation. The PhD candidate should send the written dissertation to their dissertation committee at least one month prior to the dissertation defense.

The oral dissertation defense will be open to the public and will include a Q&A session. Following the presentation, the dissertation committee will communicate their assessment of whether they consider the candidate’s dissertation requirement fulfilled. Once the dissertation requirement is fulfilled, the PhD candidate is ready to graduate. Students then apply to graduate and follow the formatting guidelines and deadlines of their home college.

¹Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MS in Network Science degree. Note that no students will be admitted directly into the MS in Network Science to pursue a master’s degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

- Coursework
- Annual reviews
- Qualifying exam
- Dissertation committee
- Dissertation proposal (comprehensive examination)
- Dissertation
- Dissertation defense

Core Requirements

Code	Title	Hours
Students must complete all 20 semester hours of the core courses listed below, unless the program director approves changes to the student’s course plan:		
NETS 5116	Network Science 1	4
NETS 6116	Network Science 2	4
NETS 7332	Machine Learning with Graphs	4
NETS 7334	Social Networks	4
NETS 7335	Dynamical Processes in Complex Networks	4

Electives

Code	Title	Hours
Complete 20 semester hours from the following elective course options.		20
The student’s elective course plan should be discussed with, and approved by, their advisor. Students who seek to apply courses not on this list to fulfill program requirements must obtain written approval from their advisor and the program director. Elective options below are organized by domain areas. Students may take courses from one or more domain areas.		

Computational Social Science

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5314	Complexity in Social Systems
CNET 5411	Financial and Economic Networks
CNET 5901	Visualizing Complex Networks

CNET 5902	Communicating Network Data
NETS 7341	Network Economics
NETS 7350	Bayesian and Network Statistics
NETS 7360	Research Design for Social Networks
NETS 7370	Computational Urban Science
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHYS 7332	Network Science Data 2
Computer Science	
CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6220	Data Mining Techniques
CS 7180	Special Topics in Artificial Intelligence
CS 7260	Visualization for Network Science
CS 7295	Special Topics in Data Visualization
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHYS 7332	Network Science Data 2
Epidemiology and Public Health	
CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5515	Complex Network Analysis for Biological Systems
CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
NETS 7370	Computational Urban Science
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6202	Intermediate Epidemiology
PHTH 6400	Principles of Population Health 1
PHTH 6410	Principles of Population Health 2
PHTH 6800	Causal Inference in Public Health Research
PHYS 7332	Network Science Data 2
Mathematic and Physics	
CNET 5901	Visualizing Complex Networks
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CS 5800	Algorithms
MATH 7233	Graph Theory
MATH 7243	Machine Learning and Statistical Learning Theory 1
NETS 7976	Directed Study
NETS 8941	Network Science Literature Review Seminar
PHYS 5211	Introduction to Scientific Computing
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
PHYS 7332	Network Science Data 2

Dissertation

Code	Title	Hours
Precandidacy		
Students should register for NETS 8986 after passing the qualifying exam and before completing the comprehensive exam (proposal defense):		
NETS 8986	Research	
Dissertation		
After passing the comprehensive exam (reaching candidacy), students should register for NETS 9990 and NETS 9991, successively:		
NETS 9990	Dissertation Term 1	
NETS 9991	Dissertation Term 2	
Dissertation Continuation		
After completing both NETS 9990 and NETS 9991, students should register for NETS 9996 each semester until graduation:		
NETS 9996	Dissertation Continuation	

Program Credit/GPA Requirements

40 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Typical Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
Elective course		4 NETS 7334	4
Elective course		4 One elective course	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
NETS 7332		4 NETS 7335	4
One elective course		4 One elective course	4
		8	8
Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0

Total Hours: 40

Alternate Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
NETS 7332		4 NETS 7334	4
One elective course		4 NETS 7335	4
		12	12

Year 2			
Fall	Hours	Spring	Hours
Elective		4 Elective	4
Elective		4 Elective	4
		8	8
Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0
Total Hours: 40			

Personal Health Informatics, PhD (Boston)

Northeastern University's Doctor of Philosophy in Personal Health Informatics is a transdisciplinary doctoral program focused on educating top researchers in the theoretical underpinnings, design, evaluation, and dissemination of consumer- and patient-focused health systems. Personal health technologies are those that non-health professionals interact with *directly*, both in and out of a clinical setting and in various life stages of illness and wellness.

Examples include:

- Assistive technologies that aid persons with disabilities
- Consumer wellness promotion technologies
- Patient education and counseling systems
- Interfaces for reviewing personal health records
- Advanced ambulatory monitoring for supporting health
- Automated elder care systems that monitor health and support independent living
- Social networking systems connecting families and their social and medical support networks

Developing personal health interface technologies requires that professionals have skills and experience designing systems for individual patients and consumers with a wide range of backgrounds in different contexts using a variety of media, while ensuring that fielded technologies are effective, reliable, and responsive to the needs of at-risk and patient populations. Critical skills and knowledge include needs assessment, theories of interface design and health behavior, rapid prototyping and implementation, experimental design with human subjects in challenging settings, and statistical data analysis and validation. Moreover, these skills must be deployed while working with, or leading, transdisciplinary teams.

The interdisciplinary nature of the program targets students who are interested in improving health and wellness using novel technologies that directly impact the lives of consumers and patients. This is a program for students who are not only technically strong but also socially conscious, design oriented, and interested in rigorously evaluating the technologies they imagine and build. The program provides a path for technical students to acquire more experience in the deployment and evaluation of health technologies in the field but also a path for students with health backgrounds to develop the technical skills needed to prototype and assess creative ideas they envision for improving care. The expected length of study is five years after the bachelor's degree.

Admission Requirements

Students will be accepted with either of the following:

- A bachelor's or higher degree in a technical discipline (e.g., computer science or information science, computer systems engineering) with either academic or work experience demonstrating a commitment to working in health.
- A bachelor's or higher degree in a health science discipline (e.g., nursing, medicine, physical therapy, pharmacy, public health) with either some academic coursework in technology, such as a course in programming or design, or work experience where the applicant participated in the development, adaptation, or evaluation of consumer- or patient-facing health technology. (Otherwise outstanding applicants without programming

skills may be advised to take an introductory programming course prior to entry; otherwise outstanding applicants without any formal experience working in health settings may be advised to spend some time volunteering in a medical or community health setting prior to entry.)

Applicants will be expected to have:

- A minimum 3.000 undergraduate GPA
- A minimum total GRE score of 300 or equivalent
- A minimum GRE academic writing score of 3.5
- For international applicants, a minimum TOEFL score of 105

Minimum Academic Standards and Requirements

RESIDENCY REQUIREMENT

The residency requirement will follow the university's residency requirement for PhD programs (<https://catalog.northeastern.edu/graduate/general-admission-transfer-credit/regulations-phd-programs/>).

TEACHING REQUIREMENT

All personal health informatics PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment, or quiz, or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

DISSERTATION ADVISING

Each student will have one primary advisor from the personal health informatics doctoral program faculty.

DISSERTATION COMMITTEE

The committee will consist of at least three members: the dissertation advisor, one additional personal health informatics doctoral program faculty member, and one member external to Northeastern who is an expert in the specific personal health informatics topic of research. The dissertation committee shall include experts with both health and technology backgrounds. The dissertation advisor must be a full-time member of the Northeastern faculty.

QUALIFYING EXAMINATION

The qualifying examination consists of a three-part exam conducted by a committee of three personal health informatics doctoral program faculty members, each overseeing one part of the exam. The research core of the exam is fulfilled with submission of a high-quality paper to a strong peer-reviewed conference or journal. The health component of the exam is fulfilled when the student passes a written exam developed by a faculty member with a health sciences background, and the technical component of the exam is fulfilled when the student passes an exam developed by a faculty member with a technical background. The content of the written exams and the paper topic are developed in consultation with each faculty member.

DEGREE CANDIDACY

A student is considered a PhD degree candidate upon meeting these conditions:

- Completion of core courses with a minimum GPA of 3.000 overall on the core courses
- Completion of the qualifying examination

COMPREHENSIVE EXAM

A PhD student must submit a written dissertation proposal to the dissertation committee. The proposal should identify the research problem, the research plan, and its potential impact on the field. A presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee.

DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in personal health informatics.

Curriculum Requirements

REQUIRED AND ELECTIVE COURSES

The curriculum is designed to provide all PhD students with a strong foundation in principles critical to the design and evaluation of personal health interfaces. All students take six core courses (24 semester hours) and the user-interface practicum (1 semester hour). The student must maintain a minimum GPA of 3.500 among the six core courses and receive a grade of B or better in each of these courses. All students must also fulfill the programming fundamentals requirement (4 semester hours) and the statistics fundamentals requirement (4 semester hours), where some flexibility in course selection allows tailoring based on background and experience. Two additional research electives (8 semester hours) are selected based on research interests from the personal health informatics electives list. Students are also expected to participate in the personal health informatics seminar series during semesters when it is run.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirements

A grade of B or higher is required in each course. A cumulative 3.500 grade-point average is required for the core requirement.

Code	Title	Hours
Foundations		
HINF 5200	Theoretical Foundations in Personal Health Informatics	4
Program Design and Development		
CS 5010	Programming Design Paradigm (or another programming course)	4
CS 7340	Theory and Methods in Human Computer Interaction	4
HINF 5300	Personal Health Interface Design and Development	4
Methods and Statistics		
CS 7300	Empirical Research Methods for Human Computer Interaction	4
Complete one of the following:		3-4
CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CS 7200	Statistical Methods for Computer Science	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
Evaluation		
HINF 5301	Evaluating Health Technologies	4
HINF 8982	Readings	1-8

Electives

Code	Title	Hours
Complete 12–17 semester hours in the following subject areas to fulfill the minimum program hours (see faculty advisor for other acceptable elective courses):		12-17
CAEP		
CS		
HINF		
HLTH		
PHTH		

Dissertation

Code	Title	Hours
HINF 9990	Dissertation Term 1	
HINF 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Sample Plan of Study

Code	Title	Hours
Year 1		
<i>Fall Semester</i>		
CS 7340	Theory and Methods in Human Computer Interaction	
HINF 5200	Theoretical Foundations in Personal Health Informatics	

Spring Semester

CS 5010	Programming Design Paradigm
or CS 5520	Mobile Application Development
CS 7300	Empirical Research Methods for Human Computer Interaction

Year 2*Fall Semester*

HINF 5300	Personal Health Interface Design and Development
PTH 5210	Biostatistics in Public Health
or PTH 6440	Advanced Methods in Biostatistics
or CAEP 7712	Intermediate Statistical Data Analysis Techniques
or CS 7200	Statistical Methods for Computer Science

Spring Semester

HINF 5301	Evaluating Health Technologies
Personal health informatics electives	

Year 3*Fall Semester*

HINF 9990	Dissertation Term 1
HINF 8982	Readings

Spring Semester

HINF 9991	Dissertation Term 2
Personal health informatics electives	

Year 4*Fall Semester*

HINF 9996	Dissertation Continuation

Spring Semester

HINF 9996	Dissertation Continuation

Year 5*Fall Semester*

HINF 9996	Dissertation Continuation

Spring Semester

HINF 9996	Dissertation Continuation

Data Science, MS (Boston)

Khoury College of Computer Sciences and the College of Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science—Align fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Engineering Theory and Modeling—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 113).

Data Science Core

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Programming with Data		
DS 5110	Essentials of Data Science	4
Algorithms		
CS 5800	Algorithms	4
or EECE 7205	Fundamentals of Computer Engineering	
Machine Learning		
CS 6140	Machine Learning	4
or EECE 5644	Introduction to Machine Learning and Pattern Recognition	
Interdisciplinary Capstone		
DS 5500	Data Science Capstone	4

Data Science Concentration Options

Complete one of the following concentrations:

- Computer Science (p. 170)—Khoury College of Computer Sciences
- Engineering Theory and Modeling (p.)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Complete 16 semester hours from the following: ¹		16
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7250	Information Visualization: Theory and Applications	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
CS 7990	Thesis	
CS 8674	Master's Project	
DS 7995	Project	

ENGINEERING THEORY AND MODELING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Foundational Courses		
Complete 4 semester hours from the following: ¹		4
DS 7995	Project	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7346	Probabilistic System Modeling and Analysis	
IE 6400	Foundations for Data Analytics Engineering	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
Translational and Advanced Courses		
Complete the remaining 12 semester hours from the following:		12
BIOE 5750	Modeling and Inference in Bioengineering	
BIOE 5880	Computational Methods in Systems Bioengineering	
BIOE 6200	Mathematical Methods in Bioengineering	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5645	Parallel Processing for Data Analytics	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7215	Introduction to Distributed Intelligence	
EECE 7223	Riemannian Optimization	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7945	Master's Project	
IE 5137	Computational Modeling in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	
IE 5630	Biosensor and Human Behavior Measurement	
IE 5640	Data Mining for Engineering Applications	
IE 6400	Foundations for Data Analytics Engineering	
IE 6600	Computation and Visualization for Analytics	
IE 6700	Data Management for Analytics	
IE 6750	Data Warehousing and Integration	
IE 7270	Intelligent Manufacturing	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7295	Applied Reinforcement Learning in Engineering	
IE 7300	Statistical Learning for Engineering	

IE 7500 Applied Natural Language Processing in Engineering

IE 7615 Neural Networks and Deep Learning

- ¹ Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional hour, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Extended Realities, MS (Boston)

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality.

This program is structured to allow students flexibility and specialization to choose a path that matches their interest. Students have an opportunity to focus on a concentration area that matches their professional background and aspirations.

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their home college. The concentrations are associated with the following colleges:

- Khoury College of Computer Sciences
 - Artificial Intelligence
 - Human Computer Interaction
- D'Amore-McKim School of Business
 - Entrepreneurship
 - Marketing
- Bouvé College of Health Sciences
 - Human Movement Science
- College of Social Sciences and Humanities
 - Information Ethics
 - Public History
- College of Engineering
 - Wireless Networking
- College of Arts, Media and Design
 - XR and Design
 - XR and Games
 - XR and Media

The Master of Science in Extended Realities welcomes students from a diverse range of backgrounds because of the applications of XR technology used in many disciplines and industries including medicine, business, entertainment, architecture, and journalism.

Some concentrations may require a technical background and are noted in the requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Extended Reality Core

Code	Title	Hours
Required Courses		
EXRE 5010 and EXRE 5011	Immersive Media: Extended Realities (XR) History, Theory, and Impact and Seminar for EXRE 5010	5
EXRE 5020	Developing Extended Realities (XR)	4
EXRE 5030	Designing Extended Realities (XR)	4
EXRE 7500 or EXRE 7990	Extended Realities (XR) Project Thesis	4
GSND 5122	Business Models in the Game Industry	1

Extended Reality Concentration Options

Complete one of the following options:

- Artificial Intelligence (p. 176)—Khoury College of Computer Sciences
- Entrepreneurship (p. 176)—D'Amore-McKim School of Business

- Human Computer Interaction (p. 176)—Khoury College of Computer Sciences
- Human Movement Science (p. 176)—Bouv  College of Health Sciences
- Information Ethics (p. 177)—College of Social Sciences and Humanities
- Marketing (p. 177)—D'Amore-McKim School of Business
- Public History (p. 177)—College of Social Sciences and Humanities
- Wireless Networking (p. 178)—College of Engineering
- XR and Design (p. 178)—College of Arts, Media and Design
- XR and Games (p. 178)—College of Arts, Media and Design
- XR and Media (p. 178)—College of Arts, Media and Design

Program Credit/GPA Requirements

34 total semester hours required. Some concentrations may require more than 34 semester hours to complete.

Minimum 3.000 GPA required

CONCENTRATION IN ARTIFICIAL INTELLIGENCE—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Requires a background in computer science.		
CS 5097	Mixed Reality	4
CS 5100	Foundations of Artificial Intelligence	4
CS 6120	Natural Language Processing	4
CS 6140	Machine Learning	4
or DS 5220	Supervised Machine Learning and Learning Theory	

CONCENTRATION IN ENTREPRENEURSHIP—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
INNO 6200	Enterprise Growth and Innovation	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
GE 5030	Iterative Product Prototyping for Engineers	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

CONCENTRATION IN HUMAN COMPUTER INTERACTION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Required Courses		
CS 5340	Computer/Human Interaction	4
Electives		
Complete 12 semester hours from the following:		12
ARTG 5710	Design for Dignity	
CS 5097	Mixed Reality	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 6350	Empirical Research Methods	
CS 7390	Special Topics in Human-Centered Computing	
GSND 6340	Biometrics of Design	

CONCENTRATION IN HUMAN MOVEMENT SCIENCE—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
Required Courses		
GSND 6340	Biometrics of Design	4
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
Electives		
Complete 7–8 semester hours from the following:		7-8
PT 5133	Kinesiology	
PT 5150	Motor Control, Development, and Learning	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 5410	Functional Human Neuroanatomy	
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	
PT 7020	Technologies in Movement and Rehabilitation Science	

CONCENTRATION IN INFORMATION ETHICS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
Electives		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MARKETING—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

CONCENTRATION IN PUBLIC HISTORY—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
HIST 5237	Issues and Methods in Public History	4
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1 (to be taken twice)	
Electives		
Complete 8 semester hours from the following:		8

HIST 5241	Exhibits and Museums
HIST 7250	Topics in Public History (Public History and Slavery)
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)

CONCENTRATION IN WIRELESS NETWORKING—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
EECE 5512	Networked XR Systems	
EECE 7374	Fundamentals of Computer Networks	
Electives		
Complete 8 semester hours from the following:		8
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	

CONCENTRATION IN XR AND DESIGN—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5640	Prototyping for Experience Design	4
EXRE 6500	Extended Realities (XR) Studio	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN XR AND GAMES—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
Electives		
Complete 8 semester hours from the following:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6001	Advanced Topics in Game Science	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6330	Player Experience	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	
GSND 6460	Generative Game Design	

CONCENTRATION IN XR AND MEDIA—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4

Elective

Complete 4 semester hours from the following:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics	
JRNL 6341	Telling Your Story with Data	

Plan of Study**Sample Plan of Study**

The following is a sample plan of study for a student in the Concentration in XR and Games.

Year 1			
Fall	Hours	Spring	Hours
EXRE 5010 and EXRE 5011		5 EXRE 5030	4
EXRE 5020		4 GSND 5110 and GSND 5111	5
		9	9
Year 2			
Fall	Hours	Spring	Hours
EXRE 6500		4 EXRE 7500	4
GSND 5122		1 XR and games elective 2	4
XR and games elective 1		4	
		9	8
Total Hours: 35			

Game Science and Design, MS (Boston)

The Master of Science (MS) in Game Science and Design is a program that seeks to give students a comprehensive understanding of how successful game products are created in a player-centric environment. Successful graduates who wish to become professional game developers or game user research experts should be able to collaborate effectively in this dynamic and burgeoning field of practice and research. Focusing on the science of game development, students have an opportunity to learn the design and technological skills needed to build a game and develop a deep understanding of playability and analytics that makes products successful in an increasingly competitive marketplace.

The game industry has expanded to include social and mobile gaming; augmented and virtual reality; as well as games in health, education, and training. Rapid innovations are happening in player psychology, middleware, graphics and authoring tools, game mechanics, and artificial intelligence and narrative techniques. It has become an increasingly competitive space.

The selectiveness of the industry and the diversity of the skills required mean that students seeking entry need both broad and deep skills. As an emergent industry using diverse technology and collaborative practices, the game industry needs professionals with interdisciplinary skill sets who can blend knowledge about development with knowledge about evaluation methods and players' behavior and psychology.

Jointly offered by Northeastern's College of Arts, Media and Design and Khoury College of Computer Sciences (<https://www.khoury.northeastern.edu/>), the **Master of Science in Game Science and Design** is a one-of-a-kind interdisciplinary program that seeks to prepare students to meet this need by weaving together science and design. This is a two-year, 34-semester-hours program.

All admitted students will be assigned to an advisor who will help them select a pathway with a coherent set of electives depending on their career goals. The advisor will also monitor their progress through the master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
GSND 5122	Business Models in the Game Industry	1

GSND 5130	Mixed Research Methods for Games	4
Thesis		
Students complete Games Project, then select either Thesis or a second completion of Games Project, in consultation with the program coordinator.		
GSND 7995	Games Project	4
<i>Thesis Conclusion</i>		
Complete an additional 4 Semester Hours from the following:		4
GSND 7990	Thesis	
GSND 7995	Games Project	

Core Electives

Code	Title	Hours
Game Design		
Complete one of the following:		4
GSND 6000	Advanced Topics in Game Design	
GSND 6225	Applied Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
Game Science		
Complete one of the following:		4
GSND 6001	Advanced Topics in Game Science	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	

Other Electives

Code	Title	Hours
Complete any two (8 Semester Hours) of the following courses listed.		8
If ARTG 5000 or GSND 6000 or GSND 6001 is completed more than once, the additional completions may be allowed toward the electives.		
Elective courses outside of CAMD are subject to availability and registration policy of the home college.		
Science		
CS 5340	Computer/Human Interaction	
PSYC 4612	Laboratory in Cognition	
Programming		
CS 5150	Game Artificial Intelligence	
CS 5850	Building Game Engines	
GSND 6460	Generative Game Design	
Art		
ARTG 5000	Topics in Design	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5130	Visual Communication for Information Design	
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
Extended Realities		
EXRE 5010	Immersive Media: Extended Realities (XR) History, Theory, and Impact	
EXRE 5011	Seminar for EXRE 5010	
EXRE 5020	Developing Extended Realities (XR)	
EXRE 5030	Designing Extended Realities (XR)	
Other		
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5610	Design Systems	
ARTG 5640	Prototyping for Experience Design	
ARTG 6310	Design for Behavior and Experience	

CS 5520	Mobile Application Development
CS 5610	Web Development
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5302	Information Design and Visual Analytics
JRNL 6341	Telling Your Story with Data

Program Credit/GPA Requirements

34 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Sample Plan of Study

TWO YEARS, ONE (OPTIONAL) CO-OP

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
GSND 5110		4 Elective		4 Co-op (optional)	0
GSND 5111		1 Elective		4	
GSND 5130		4			
		9		8	0
Year 2					
Fall	Hours	Spring	Hours		
GSND 5122		1 GSND 7990 or 7995		4	
GSND 7995		4 Elective		4	
Elective		4			
		9		8	

Total Hours: 34

Health Informatics, MS (Boston)

Northeastern University's interdisciplinary Master of Science in Health Informatics was the first MS in the field and is now one of the few that is fully interdisciplinary between health science and computer science.

The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Students may opt to select a concentration to deepen their knowledge in a particular area. Successful students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, information technology professionals, and patients.

Please visit Bouvé College Learning Outcomes (<http://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B– or higher is required in each course.

Core Requirements

Code	Title	Hours
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
Choose one of the following courses in consultation with your advisor:		
HINF 5105 or HINF 5106	The American Healthcare System The Canadian Healthcare System	3

Program Options

Choose one of the following options:

- Health Informatics (Without Concentration) (p. 448)
- Health Informatics with Health Informatics Analytics Concentration (p. 449)
- Health Informatics with Personal Health Informatics Concentration (p. 449)

Program Credit/GPA Requirements

Minimum 33 total semester hours required

Minimum 3.000 GPA required

HEALTH INFORMATICS (WITHOUT CONCENTRATION)

Code	Title	Hours
Required Coursework in Addition to Core Requirements		
<i>Business Management</i>		
Complete two of the following:		6
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
or EMGT 5220	Engineering Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Management and Leadership in Public Health and Healthcare	
<i>Health Informatics</i>		
Complete two of the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 5301	Evaluating Health Technologies	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PHTH 5232	Evaluating Healthcare Quality	
<i>Technical</i>		
Complete two of the following:		6
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	
HINF 6400	Introduction to Health Data Analytics	
HLTH 5800	AI Across the Health Sciences	
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6210	Applied Regression Analysis	
PHTH 6400	Principles of Population Health 1	
PHTH 6440	Advanced Methods in Biostatistics	
One course from the following may count toward the technical core requirement:		
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
<i>Capstone</i>		
HINF 7701	Health Informatics Capstone Project	3
<i>Electives</i>		
Complete two of the following:		6

DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
HINF 6345	Design for Usability in Healthcare
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
PHIL 5110	Responsible AI

HEALTH INFORMATICS ANALYTICS CONCENTRATION

Code	Title	Hours
Required Coursework in Addition to Core Requirements		
<i>Business Management</i>		
Complete two of the following:		6
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
or EMGT 5220	Engineering Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Management and Leadership in Public Health and Healthcare	
<i>Health Informatics</i>		
Complete two of the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 5301	Evaluating Health Technologies	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PHTH 5232	Evaluating Healthcare Quality	
<i>Technical</i>		
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4
<i>Capstone</i>		
HINF 7701	Health Informatics Capstone Project	3
Elective		
Complete one of the following:		4
IE 5137	Computational Modeling in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5640	Data Mining for Engineering Applications	
IE 6600	Computation and Visualization for Analytics	
IE 6700	Data Management for Analytics	
IE 7275	Data Mining in Engineering	

PERSONAL HEALTH INFORMATICS CONCENTRATION

Code	Title	Hours
Required Coursework in Addition to Core Requirements		
<i>Health Informatics</i>		
HINF 6205	Creation and Application of Medical Knowledge	3
<i>Technical</i>		
CS 5340	Computer/Human Interaction	4
Complete one of the following. Students must petition to take electives outside the approved list:		4
CS 5010	Programming Design Paradigm	

CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 6200	Information Retrieval	
Complete one of the following:		3
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	
<i>Theory and Evaluation</i>		
PHTH 5210	Biostatistics in Public Health ¹	3
Complete one of the following:		4
CS 6350	Empirical Research Methods (On campus only)	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
Culminating Experience		
Complete one of the two options below.		6
<i>Thesis Option</i>		
Students must enroll in HINF 7990 for two semesters for a total of 6 semester hours with director approval only and under supervision of Personal Health Informatics faculty:		
HINF 7990	Thesis	
<i>Capstone Option</i>		
HINF 7701	Health Informatics Capstone Project	
Complete any course for a minimum of 3 semester from the Health Informatics (without concentration) curriculum, that has not been used in previous requirements.		

¹ Student may petition director to take a more advanced stats course, such as Applied Regression Analysis (PHTH 6210).

Health Informatics, MS (Vancouver)

Northeastern University's interdisciplinary Master of Science in Health Informatics was the first MS in the field and is now one of the few that is fully interdisciplinary between health science and computer science.

The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, information technology professionals, and patients.

Please visit Bouvé College Learning Outcomes (<http://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Note: For the 2025–2026 academic year, this program will be offered in an online format. If you have questions about eligibility, please reach out to your admissions counselor.

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B– or higher is required in each course.

Code	Title	Hours
Core Requirements		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5106	The Canadian Healthcare System	3
Business Management		
Complete two of the following:		6
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
or EMGT 5220	Engineering Project Management	
HINF 6240	Improving the Patient Experience through Informatics	

HINF 6335	Management Issues in Healthcare Information Technology	
PTHH 5226	Management and Leadership in Public Health and Healthcare	
Health Informatics		
Complete two of the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 5301	Evaluating Health Technologies	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PTHH 5232	Evaluating Healthcare Quality	
Technical		
Complete two of the following:		6
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	
HINF 6400	Introduction to Health Data Analytics	
HLTH 5800	AI Across the Health Sciences	
PTHH 5202	Introduction to Epidemiology	
PTHH 5210	Biostatistics in Public Health	
PTHH 6210	Applied Regression Analysis	
PTHH 6400	Principles of Population Health 1	
PTHH 6440	Advanced Methods in Biostatistics	
One course from the following may count toward the technical core requirement:		
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
PHIL 5110	Responsible AI	
Capstone		
HINF 7701	Health Informatics Capstone Project	3
Electives		
Complete two of the following:		6
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
HINF 6345	Design for Usability in Healthcare	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	

Program Credit/GPA Requirements

Minimum 33 total semester hours required

Minimum 3.000 GPA required

Robotics, MS (Boston)

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics offers instruction by the faculty of the College of Engineering, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences. The program is designed to provide students with comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Biomedical and Rehabilitation Robotics—College of Engineering
- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

Gordon Institute of Engineering Leadership

Master's Degree in Robotics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Robotics in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved robotics technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the certificate coursework may be applied to this program's elective requirements in the coursework option.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Electrical and Computer Engineering		
Complete one of the following:		4
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Computer Science		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

Concentrations

Complete one of the following options:

- Biomedical and Rehabilitation Robotics (p. 181)—College of Engineering
- Computer Science (p. 182)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 182)—College of Engineering
- Mechanical Engineering (p. 183)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required (33 total semester hours with participation in co-op in certain concentrations)

Minimum 3.000 GPA required

BIOMEDICAL AND REHABILITATION ROBOTICS CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
Complete one of the following:		4
BIOE 5520	Bioengineering Design for Robotic Rehabilitation	
PT 5170 and PT 5171	Motor Control and Lab for PT 5170	
PT 5321	Applications of Biomechanics in Human Function and Movement	
Complete one of the following options:		16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

Students working with Department of Physical Therapy, Movement, and Rehabilitation Sciences faculty should enroll in the PT course. Students working with Department of Bioengineering faculty should choose the BIOE course.

BIOE 7945 Master's Project

or PT 7995 Master's Project

Complete 12 semester hours of courses from the elective course list. (p. 183)

Thesis Option

Students working with Department of Physical Therapy, Movement, and Rehabilitation Sciences faculty should enroll in the PT course. Students working with Department of Bioengineering faculty should choose the BIOE course.

BIOE 7945 Master's Project

or PT 7995 Master's Project

BIOE 7990 Thesis

or PT 7990 Thesis

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

Complete the following (students must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours

Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.

Required Course

Complete one additional CS course not used to fulfill the core requirements: 4

CS 5180 Reinforcement Learning and Sequential Decision Making

CS 5335 Robotic Science and Systems

Options

Complete one of the following options: 16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

CS 8674 Master's Project

Complete 12 semester hours of courses from the elective course list. (p. 183)

Thesis Option

CS 7990 Thesis

CS 8674 Master's Project

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

For students in the this concentration, please consult your academic advisor for co-op procedures.

ELECTRICAL AND COMPUTER ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours

Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional EECE course not used to fulfill the core requirements: 4

EECE 5550 Mobile Robotics

EECE 5552 Assistive Robotics

EECE 5554 Robotics Sensing and Navigation

Options

Complete one of the following options: 16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

EECE 7945 Master's Project

Complete 12 semester hours of courses from the elective course list. (p. 183)

Thesis Option

EECE 7945 Master's Project

EECE 7990 Thesis

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

Complete the following (students must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

MECHANICAL ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours

Students in the mechanical engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional ME course not used to fulfill the core requirements: 4

ME 5250	Robot Mechanics and Control
ME 5659	Control Systems Engineering

Options

Complete one of the following options: 16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

ME 7945 Master's Project

Complete 12 semester hours of courses from the elective course list. (p. 183)

Thesis Option

ME 7945 Master's Project

ME 7990 Thesis

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

Complete the following (students must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Elective Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	

CS 5097	Mixed Reality
CS 5100	Foundations of Artificial Intelligence
CS 5170	Artificial Intelligence for Human-Computer Interaction
CS 5330	Pattern Recognition and Computer Vision
CS 5340	Computer/Human Interaction
CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6350	Empirical Research Methods
CS 7140	Advanced Machine Learning
CS 7150	Deep Learning
CS 7180	Special Topics in Artificial Intelligence
EECE 5550	Mobile Robotics
EECE 5552	Assistive Robotics
EECE 5554	Robotics Sensing and Navigation
EECE 5580	Classical Control Systems
EECE 5639	Computer Vision
EECE 5642	Data Visualization
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7150	Autonomous Field Robotics
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
IE 6500	Human Performance
IE 7280	Statistical Methods in Engineering
IE 7315	Human Factors Engineering
IE 7615	Neural Networks and Deep Learning
ME 5240	Computer Aided Design and Manufacturing
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6250	Wearable Robotics
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7247	Advanced Control Engineering
PT 5170	Motor Control
PT 5321	Applications of Biomechanics in Human Function and Movement
PT 7001	Core Concepts in Rehabilitation Science and Research
PT 7005	Experimental Design and Applied Statistics
PT 7020	Technologies in Movement and Rehabilitation Science

Robotics, MS (Seattle)

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics is offered by the College of Engineering and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Electrical and Computer Engineering		
Complete one of the following:		4
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Computer Science		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

Concentrations

Complete one of the following concentrations:

- Computer Science (p. 185)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 185)—College of Engineering
- Mechanical Engineering (p. 186)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required (33 total semester hours with participation in co-op in certain concentrations)

Minimum 3.000 GPA required

CONCENTRATION IN COMPUTER SCIENCE

Code	Title	Hours
Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.		
Required Course		
Complete one additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p.)		
<i>Project Option</i>		
CS 8674	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p.)		
<i>Thesis Option</i>		
CS 8674	Master's Project	
CS 7990	Thesis	
Complete 8 semester hours of courses from the elective course list. (p.)		

Optional Co-op

For students in the this concentration, please consult your academic advisor for co-op procedures.

CONCENTRATION IN ELECTRICAL AND COMPUTER ENGINEERING

Code	Title	Hours

Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional EECE course not used to fulfill the core requirements:	4

EECE 5550	Mobile Robotics
EECE 5552	Assistive Robotics
EECE 5554	Robotics Sensing and Navigation

Complete one of the following options:	16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p.)

Project Option

EECE 7945	Master's Project

Complete 12 semester hours of courses from the elective course list. (p.)

Thesis Option

EECE 7945	Master's Project

EECE 7990	Thesis

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p.)

Optional Co-op

Complete the following (students in EECE and MIE concentrations must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

CONCENTRATION IN MECHANICAL ENGINEERING

Code	Title	Hours

Students in the mechanical engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional ME course not used to fulfill the core requirements:	4

ME 5250	Robot Mechanics and Control
ME 5659	Control Systems Engineering

Complete one of the following options:	16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p.)

Project Option

ME 7945	Master's Project

Complete 12 semester hours of courses from the elective course list. (p.)

Thesis Option

ME 7945	Master's Project

ME 7990	Thesis

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p.)

Optional Co-op

Complete the following (students in EECE and MIE concentrations must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1

ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Elective Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
DS 5220	Supervised Machine Learning and Learning Theory	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)	
IE 6500	Human Performance	
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	
IE 7615	Neural Networks and Deep Learning	
ME 5240	Computer Aided Design and Manufacturing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5654	Elasticity and Plasticity	
ME 5655	Dynamics and Mechanical Vibration	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6260	Introduction to Microelectromechanical Systems (MEMS)	
ME 7247	Advanced Control Engineering	

Data Analytics, Graduate Certificate (Boston)

The interdisciplinary Graduate Certificate in Data Analytics is offered through a collaboration between the Khoury College of Computer Sciences and the College of Social Sciences and Humanities. The certificate curriculum emphasizes the skills needed to bridge between emerging technological capacities and traditional policymaking processes. The program is designed to provide students with foundational knowledge in data science—

including data management, machine learning, data mining, statistics, and visualizing and communicating data—that can be applied to data-driven decision making in any discipline.

For more information on the certificate, refer to the program's website (<https://www.northeastern.edu/graduate/program/graduate-certificate-in-data-analytics-boston-14423/>).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

College of Engineering

Website (<http://www.coe.neu.edu/academics/graduate-school-engineering/>)

Gregory D. Abowd, PhD, Dean

Stefano Basagni, PhD, Associate Dean of the Global Engineering Campus

Josep Miquel Jornet, PhD, Associate Dean of Research

Sagar Kamarthi, PhD, Associate Dean of Graduate Education

Mark Niedre, PhD, Associate Dean of PhD Education

130 Snell Engineering Center

617.373.2711

The Graduate School of Engineering offers research and professional degree programs organized around a core curriculum that equips students with a solid foundation for technical and leadership positions in industry organizations, government laboratories, research laboratories, and educational institutions. By involving students in many levels of research, encouraging collaboration across departments, and partnering with outside institutions and organizations globally, Northeastern University engineering graduate students have the opportunity to gain a rich and experiential education in their chosen discipline.

Master of Science and doctoral degree programs are offered, as well as numerous graduate certificate programs that can be applied toward master's degree programs for lifelong learning. The GSE offers traditional full-time day and part-time evening master's and doctoral degree programs and part-time evening certificate programs. Programs are offered in Boston, Arlington, Miami, Seattle, Silicon Valley, Oakland, Portland (Maine), Toronto, and Vancouver. A number of courses and degree programs are also available in a flexible online or hybrid format, which are well suited for distance learners. Innovative programs, such as interdisciplinary degrees, business/entrepreneurship pathways, and programs for students without an undergraduate engineering degree (or who need additional preparatory coursework), enable students to personalize their learning experience.

Academic Policies

- Academic Dismissal Policy (p. 461)
- Academic Integrity Policy (p. 461)
- Academic Standing Policy (p. 462)
- Appeals Policy (p. 462)
- Attendance Policy (p. 463)
- Campus Transfer and Location Change (p. 463)
- Certificate Policies and Procedures (p. 464)
- Course Registration (p. 466)
- Course Retake / Course Substitution (p. 466)
- Course Selection (p. 467)
- Dissertation Committee (p. 467)
- Grievance Policy (p. 468)
- PhD Student Progress and Review (p. 468)
- Program Completion (p. 469)
- Reenrollment Policy for Full-time Students (p. 469)
- Thesis Policy (p. 470)

Academic Dismissal Policy

A student placed on academic probation for a cumulative grade-point average of less than 3.000 will have one academic term to raise the cumulative GPA greater than or equal to 3.000. Students whose cumulative GPA is below 3.000 for two consecutive terms in which they took courses for credit (including Career Management for Engineers (ENCP 6000) or Introduction to Cooperative Education (ENCP 6100), if taken) will automatically be dismissed from their degree program at the end of the second term. Students in this situation may submit an Academic Dismissal Appeal form to the graduate school, *to be reviewed by the student's academic department*, to request a final one-term extension. Students whose cumulative GPA is below 3.000 for three consecutive terms will automatically be dismissed from their degree program.

A student will also be dismissed from their degree program if they do not meet the requirements of their program.

A student who is dismissed from their program may submit an appeal through the college's graduate appeals process.

Students dismissed from their program will receive a written notification from the Graduate School of Engineering.

Academic Integrity Policy

Graduate students are expected to abide by Northeastern University's Academic Integrity Policy (p. 88).

A faculty member who suspects that a graduate student has violated the university's Academic Integrity Policy must offer to meet with the student to discuss the suspected violation. The faculty member may ask the student to provide supporting documentation and may gather information from other students involved in the incident.

If the faculty member finds that the student has violated the Academic Integrity Policy, the faculty member may take action as the faculty member considers appropriate and can include adjusting the student's grade, requiring additional academic work, forfeiture of co-op opportunity, and/or failing the qualifying examination. In this case, the faculty member is encouraged to submit an information-only report about the incident to the university Office of Student Conduct and Conflict Resolution, which handles suspected violations of the Academic Integrity Policy. Any penalties must be imposed by the faculty member within three weeks of the suspected violation.

If the student is not satisfied with the faculty member's decision, the student may appeal to the department by contacting the department head (or designee) who should apply the department's procedures to review the case. If the suspected violation took place in a department or if it involved cooperative education, the appeal should be submitted to that unit. Otherwise, the appeal should be submitted directly to the college. The student should appeal within one week of the imposition of penalties.

The department will either affirm the faculty member's decision or substitute an alternative decision. The department's decision should be made within two weeks of receiving the appeal.

The student may appeal the department decision using the college's academic appeal process. The college will either affirm the department's decision or substitute an alternative decision.

The student may appeal the college decision using the university's academic appeal process.

The faculty member may appeal the department or college decision by submitting a complaint to OSCCR, which will determine whether the student is responsible for the suspected violation. OSCCR will make a recommendation to the senior vice provost for student affairs who will make a final decision.

If the student is found to be responsible for a violation by OSCCR, the faculty member may take action as appropriate. If the student is found to be not responsible for a violation, the faculty member cannot take action and if action was previously taken, the action must be reversed.

The dean (or designee) of the involved college shall take whatever action is necessary to implement the resolution of the case, including reporting a change of grade to the Office of the University Registrar.

Academic Standing Policy

Academic standing at Northeastern University is determined by a student's cumulative grade-point average.

Academic probation is a period of time when a student must address and remediate academic deficiencies.

Full-time Students

Full-time graduate students are expected to maintain a cumulative GPA of 3.000 or higher each term to remain in good academic standing and to progress toward graduation.

Students falling below a cumulative GPA of 3.000 are placed on academic probation for each academic term in which the cumulative GPA is below 3.000 after the completion of at least 8 semester hours. Full-time students must raise the cumulative GPA to 3.000 or higher after completion of at least 8 additional semester hours to regain good academic standing status.

Part-time Students

Graduate students in official part-time status with the university are expected to maintain a cumulative GPA of 3.000 or higher each term to remain in good academic standing and to progress toward graduation.

Students falling below a cumulative GPA of 3.000 after at least 8 semester hours are completed are placed on academic probation. Part-time students must raise the cumulative GPA to 3.000 or higher after completion of at least 8 additional semester hours to regain good academic standing status.

Summer Term

There are three semesters during the summer session: Summer First Half, Summer Second Half, and Summer.

Academic standing for the summer terms will be reviewed and evaluated for all students at the end of the Summer Second Half. If students complete fewer than 8 semester hours during any of the summer semesters combined, their academic standing is evaluated after the completion of at least 8 semester hours.

Appeals Policy

It is the policy of Northeastern University that all students shall be treated fairly with respect to evaluations made of their academic performance, standing, and progress. This policy provides an appeals mechanism to students who believe that they have been erroneously, capriciously, inappropriately, or otherwise unfairly treated in an academic determination.

The university presumes that academic judgments by its faculty are fair, consistent, and objective. Substitution of a different academic judgment for that of the original evaluator is a serious intrusion upon academic prerogatives entrusted to the faculty and others involved in academic evaluations.

This policy applies to appeals related to academic determinations in COE graduate courses, regardless of the student's home college, and graduate programs. Appeals related to graduate courses or programs offered by another college should be handled by that college. Appeals related to third-semester dismissals should be submitted directly to the college.

Step 1. The student should first speak with the involved faculty or staff member about any determination about which they have questions and attempt to reach a resolution.

Step 2. If the student is not satisfied with the decision, the student may appeal. If the appeal relates to a course or program offered by a department, the appeal should be submitted to that department. Otherwise, the appeal should be submitted directly to the college. Department appeals should be submitted to the department chair (or designee) who should apply the department's procedures to review the case. The student must appeal within four weeks of the academic determination.

A student shall initiate this appeal of an academic determination by submitting a written statement that specifies the details of the action or judgment that they seek to appeal. This statement must start with a clear description of the basis for the appeal and should include basic facts about the situation leading to the appeal, when the situation occurred, who was involved, and the resolution sought by the student. All relevant supporting materials should be attached as addenda to the statement. Appeals should avoid unsubstantiated, defamatory, or ad hominem accusations regarding the motivations of the faculty member or other persons involved in making the academic determination.

The department will either affirm the original decision or substitute an alternative decision. The department's decision shall be made in writing and include the reasoning behind the decision. The department's decision must be made within two weeks of receiving the appeal.

Step 3. The student may appeal the department's decision to the college. To initiate the college appeal, the student shall submit to the associate dean of graduate education their statement, the department's response, and any additional information the student would like to be considered. Appeals to the college are reviewed by the Graduate Appeals Committee, which makes recommendations to the associate dean for graduate education. The student shall be offered the opportunity to meet with the committee to make a statement, present relevant facts of the case, and respond to clarifying questions the committee may have regarding the case. The chair of the committee reserves the right to end this meeting after 10 minutes if no further relevant facts are forthcoming. The committee may invite faculty and staff members to discuss the case and share relevant information.

The committee will either affirm the original decision, substitute an alternative decision, or refer the case back to the department for additional consideration. The committee's decision shall be made in writing and include the reasoning behind the decision. The committee's decision must be made within two weeks of receiving the appeal.

Step 4. Upon receiving the recommendation of the committee, the associate dean for graduate education shall review the case and make a final decision for the college.

Attendance Policy

In each term, students enrolled in on-ground sections are expected to be on campus and attending class beginning with the first day of classes. Students in online sections are expected to log in and participate in class beginning with the first day of classes.

Students who join a class after the first day of class during the university add period, or who are approved for late registration by the instructor and the Graduate School of Engineering, are responsible for all coursework missed prior to enrolling. Enrolled students who do not attend class during the first week of a semester risk being dropped from the course.

In the interest of students' success, the college does not support the arrival of students to class after the university add deadline. Students should not expect to be added to a class after the university add deadline and will be held responsible for the academic, financial, or immigration consequences due to their late or nonattendance without prior approval.

In cases where an enrolled student cannot arrive to campus by the first day of class due to circumstances beyond their control, it is the student's responsibility to contact the instructor for approval and notify the Graduate School of Engineering.

Campus Transfer and Location Change

This page outlines policy and procedure related to MS students transferring to a different Northeastern campus ("Campus Transfer") and enables mobility within our Global Network ("Location Change").

The Campus Transfer and Location Change policy applies to transfer/changes within the United States. Transfers within Canada, from the United States to Canada, or vice versa are not permitted.

Campus transfers and location changes are for continuing students only. Students who have not yet started their program should contact the admissions office.

Students may not transfer from a Global Network campus to Boston. Students may only have one campus transfer or location change per program.

Students who received a Global Network campus scholarship will not maintain their scholarship following campus transfer or location change. If the new campus is offering a scholarship for the student's program at the time of transfer, the student will be eligible to apply for that scholarship.

Campus transfers and location changes may depend on the credits completed and length of time the new campus has been running the program. Please, see the eligibility requirements below.

The student must have a minimum grade-point average of 3.000 or higher and cannot be on academic probation.

Campus transfers and location changes are subject to program approval even if students meet all eligibility requirements.

Definitions

CAMPUS TRANSFER

Students may request an official campus transfer from their school/college to complete their program. Students requesting an official campus transfer will transfer to a Northeastern U.S. Global Network Campus (new campus) to finish their degree requirements. The permanent transfer must be approved by the school/college academically and must meet regulatory requirements (state licensure). If the student is an international student, the program must be offered in compliance with F-1/J-1 requirements at the requested new campus location. International students should seek advice from the Office of Global Services (<https://international.northeastern.edu/ogs/>) before their final decision to transfer to another campus.

SHORT-TERM CAMPUS LOCATION CHANGE

Students who want to visit one of the Northeastern U.S. Global Network Campuses for one or two terms may request an official location change (the new campus) for a period no longer than one academic year (a fall and spring semester) and for no more than 50% of a degree program. The change must be approved by the school/college academically, and courses must be offered that allow the student to make normal academic progress in compliance with regulatory requirements. For international students to change their campus location, the academic program must be offered in compliance with F-1/J-1 requirements at the requested new campus location. If the location change is approved, the home campus will remain unchanged on the student's record.

Eligibility

The academic advisors (primary academic advisor and new campus academic advisor) collaborate with the student to determine academic eligibility. We recommend that students meet with their advisors to discuss the reasoning for their campus change request, any program-specific requirements, and eligibility. To be academically eligible:

- Students intending to begin at their new campus location for the fall may do so after completing their first two courses of the program (four for MSIS—Bridge programs), provided that the campus has already run that program for one semester and is offering second-semester courses.
- Students intending to begin at their new campus location for the spring may do so after completing the first four courses of the program (six for MSIS—Bridge programs) provided that the campus has already run that program for one semester and is offering second-semester courses.
- Students completing courses 6 through 8 of their programs (9 through 10 for MSIS—Bridge programs) are not eligible to transfer to a new campus within the network that has not run the program for more than two semesters.
- The student must have a minimum GPA of 3.000 or higher and cannot be on academic probation.
- Campus transfers and location changes are subject to program approval even if students meet all eligibility requirements.

Process

Students requesting an official campus transfer or a location change are required to apply at least one month before the start of the term. The request can be made as early as a week before registration opens. Please refer to the Academic Calendar for these dates.

- A student interested in a campus transfer or location change needs to contact their primary academic advisor and the academic advising team of the new campus to determine eligibility.
 - Seattle: coe-seattle-gradadvising@northeastern.edu
 - Silicon Valley: coe-sv-gradadvising@northeastern.edu
 - Portland, Maine: coe-roux-gradadvising@northeastern.edu
 - Miami: coe-miami-gradadvising@northeastern.edu
 - Arlington: coe-arlington-gradadvising@northeastern.edu
 - Oakland: coe-oakland-gradadvising@northeastern.edu
- Once the eligibility is confirmed, the student fills out the first two parts of the Registrar Campus Transfer and Location Change form (https://service.northeastern.edu/registrar/?id=kb_article_view&sysparm_article=KB000020000&sys_kb_id=abecaafc93445a10469eb53a7bba1089&spa=1) and emails it to the advisor of the new campus.
- The advisor of the new campus signs the Registrar Campus Transfer and Location Change form and emails it to the Office of the University Registrar (copying the student).
- Once approved, the Office of the University Registrar will email the student and advisor of the new campus to confirm approval and changes the campus attribute. This is only if it is a campus transfer. If it is a campus location change, the campus attribute will not be changed.
- **International students:** F-1/J-1 students must submit the OGS Intercampus Transfer Request as per the instructions on the OGS e-form. Within the Intercampus Transfer Request e-form, the student will need to download the Intercampus Transfer Clearance Letter, complete the first part (name, NUID, degree), and then send it to the new campus advisor. Once signed, the new campus advisor will email the student the Intercampus Transfer Clearance Letter. Only after completing this step, can the student electronically submit the Intercampus Transfer Request via MyOGS.

Certificate Policies and Procedures**Admission Into a Graduate School of Engineering Graduate Certificate****CURRENT GSE DEGREE-SEEKING STUDENTS**

In order to be considered admissible to a College of Engineering graduate certificate, current GSE students:

1. Must be in good academic standing. Students on academic probation will not be admitted into a graduate certificate program.
2. **Must apply for admission to a certificate program in the fall or spring semester and prior to their final term of study. Requests for admission in the summer semesters or final term will not be considered, regardless of whether coursework has been completed.**
3. Current College of Engineering PhD students must also have the approval of their PhD faculty advisor.

NON-DEGREE-SEEKING STUDENTS

In order to be considered admissible to a College of Engineering graduate certificate, non-degree-seeking students must have:

1. A minimum 3.000 grade-point average.
2. Completed a relevant engineering undergraduate degree.
 - Applicants without an engineering undergraduate degree should apply to the Graduate Certificate in Technology Systems Management.

Application Procedures

Apply via the Certificate Application for Current COE Graduate Students (<https://enroll.northeastern.edu/register/?id=ef6fb869-21a6-4e34-bc09-e830e53d13b4>). Graduate School of Engineering continuing students are not required to resubmit their admissions documents or pay the application fee. Contact the Graduate School of Engineering Admissions team (coe-gradadmissions@northeastern.edu) for questions about the application process.

Academic Standing

All certificate-seeking students must meet the GSE requirement of a 3.000 GPA to remain in good standing. Only students who complete the required coursework and remain in good standing will be eligible to be awarded a certificate.

GSE Certificate Policies

- Students must complete the certificate coursework before or in the same semester that they complete their primary degree coursework.

DOMESTIC STUDENTS

- May take courses on-ground at student's campus of study or online, provided the certificate is approved and offered at that campus.

INTERNATIONAL STUDENTS

- May take courses on-ground at student's campus of study, provided the certificate is approved and offered at that campus.
- During every required academic term, international students must maintain **full-time status and appropriate on-ground presence** at Northeastern University to comply with federal immigration regulations. International students must consult with the Office of Global Services (<https://international.northeastern.edu/ogs/>) to determine eligibility for enrollment in online courses.

Certificate Coursework Credit Sharing with GSE Degrees

In approved circumstances, certificate coursework completed by graduate students may also be applied toward requirements of a College of Engineering graduate degree program. Two factors will be considered: course eligibility and the number of courses permitted to be applied to requirements of both the degree program and the certificate program (double counting).

Course Eligibility

GSE certificate courses may be counted toward an engineering graduate degree if the **degree program** requirements allow for the course. Refer to the specific graduate degree requirements in the university catalog. Students cannot substitute any of the certificate courses, except by petition.

Course Double Counting

For most **disciplinary degrees**, students can double count up to 8 semester hours of eligible courses for a graduate degree and graduate certificate. An exception is made for the following disciplinary degrees where students can double count up to 16 semester hours of eligible courses (with academic advisor approval for courses):

- All civil and environmental engineering programs (p. 515) pursuing the climate and engineering, and sustainability engineering certificates
- MSeNeS Energy Systems (p. 660)
- MSEM Engineering Management (p. 655)
- MSIE Industrial Engineering (p. 651)
- MSOR Operations Research (p. 677)
- MSME Mechanical Engineering with concentration in General Mechanical Engineering (p. 664)

For all **multidisciplinary degree** (MGEN) programs: Students can double count up to 16 semester hours of eligible courses for a graduate degree and graduate certificate.

Double Counting Across Certificates

Engineering graduate courses may not be double counted across graduate certificates.

PlusOne Programs

Engineering graduate courses may not be triple counted for graduate certificate and/or degree programs. Graduate courses that are double counted toward the bachelor's and master's degrees (e.g., PlusOne programs) may not be counted toward a graduate certificate.

Graduate Courses Applied to an Undergraduate Degree

Graduate courses that were applied toward an undergraduate degree cannot be double counted for a graduate certificate. Graduate courses completed as an undergraduate that are taken above and beyond the requirements for the undergraduate degree may count toward a graduate certificate.

Co-op

Students enrolled in only a certificate program are not eligible to participate in co-op. Co-op eligibility will reside with the graduate degree program of the degree-seeking student. There are no additional considerations allotted by the certificate program.

Applying to Graduate

Students must apply to graduate for their certificate when the application for graduation window opens or no later than the beginning of the term they plan to graduate. If graduating with both a certificate and a degree program, they must apply for the certificate first and then the degree program. Both the certificate and degree program will be awarded concurrently, even if the certificate coursework is completed before the degree coursework.

Certificate Transcript

Awarding of a certificate will be noted on the official Northeastern University transcript of students who complete a certificate program.

Course Registration

Full-time students (domestic and international) in the Graduate School of Engineering must register for classes on an ongoing basis and carry a minimum of 8 semester hours of coursework per semester. Any student who is appointed to a stipended graduate assistantship is considered full time for the term(s) of appointment if enrolled for a minimum of 6 semester hours.

All graduate students who are registered for Dissertation Term 1, Dissertation Term 2, Dissertation Continuation, PhD Candidacy Preparation, PhD Exam Preparation, or a 0-semester-hour Research course are considered full time. Registration in these courses is restricted to students who qualify for registration in these courses.

The graduate school does not require part-time students to be enrolled for a certain minimum number of semester hours in any term. However, part-time students who are not enrolled for more than one term (excluding summer terms) should take a leave of absence from Northeastern University to maintain active student status to keep their student account active.

The maximum number of semester hours approved for a student in each term varies by the degree program. However, a student can petition their faculty advisor to request permission to register for more than the allowed maximum number of semester hours for a given term. Normally, no more than 12 semester hours (inclusive of transfer credits and advanced standing for MS programs) may be taken outside the College of Engineering, unless otherwise specified in the program requirements.

Registration in classes is mandatory to maintain an active status with the university. Students must be registered in all courses for a given term prior to the university course add/drop deadline. Students should not register for an excessive number of courses or for multiple sections of the same course with the intention of dropping half or more of the courses during the first week of classes.

Students must be registered in their last semester of study. International students should consult with the Office of Global Services (<https://international.northeastern.edu/ogs/>) if they are intending to complete their program during the summer semester. Domestic students finishing their requirements in the summer semester must be registered either in summer first-half, summer second-half, or summer term.

Any student who is financially withdrawn by Student Accounts prior to the start of any given semester will not be permitted to register for that semester until they rectify the outstanding financial obligation.

The Graduate School of Engineering will correct registration errors. Corrections may generate a new tuition bill.

Due to last-minute scheduling changes, the Graduate School of Engineering must occasionally substitute faculty or change class schedules after the registration period has begun. Any student registered for the original course will automatically be registered for the updated section should no major schedule conflicts be apparent. Otherwise, the graduate school or the department will contact all affected students for alternatives.

Northeastern reserves the right to cancel, postpone, combine, or modify any class.

The Graduate School of Engineering does not allow College of Engineering graduate students to elect a satisfactory/unsatisfactory grading scheme for courses normally letter graded.

Course Retake / Course Substitution Policy

Students in Good Academic Standing

Students who are in good academic standing may retake up to 8 semester hours of coursework in order to earn a better grade. A course may only be retaken once.

Students on Academic Probation

The Graduate School of Engineering allows students to retake (or substitute) a total of up to 8 semester hours of coursework beyond stated minimum degree requirements in order to attain the required cumulative 3.000 grade-point average for good academic standing.

Course Retake

When the appropriate course is available, courses may be retaken once in order to earn a better grade. In all cases, the most recent grade earned in a course is the one used in calculating the overall GPA; however, previous grades remain on the transcript with a note that the grade is “excluded.” This means that the course is excluded from the GPA and earned credit calculation. Students must obtain approval from their academic advisor and the Graduate School of Engineering prior to retaking a course. Students are required to pay normal tuition charges for all retaken coursework. See the university’s Retaking Courses (p. 123) page for additional requirements.

Within the above limitations for extra or retaken courses, a student must retake any required core course in which they earn a grade below C. Individual programs may have additional requirements.

Course Substitution

In cases where retaking a course is not possible, a student may petition to substitute one course for another they have already taken, as long as the course content is significantly similar and is not a core required course.

The student’s department and graduate school in conjunction with the Office of the University Registrar must approve of the substitution. See the university’s Course Substitutions (p. 114) page for additional approval requirements.

If approved, the grade in the new course taken will be included in the GPA calculation, and the first course taken will remain on the transcript with a note that the grade is “excluded” from the GPA and earned credit calculation. Students are required to pay normal tuition charges for all substituted coursework.

Course substitution is not an option for students in good academic standing.

Course Selection

Students should formulate a program of study in consultation with their assigned faculty advisor at the beginning of their program, during fall or spring orientation. Students should preselect courses whenever possible and plan to take them when offered, maintaining flexibility with alternate courses in mind. Courses other than the required courses are offered based on demand and are subject to faculty availability. Not all courses are offered every year; however, the graduate school will do everything possible to assure continuity of programs and permit students to make continuous progress toward earning their degrees.

Prerequisite Courses/Undergraduate Courses

Students are not awarded credit toward graduate degree requirements for prerequisite courses unless expressly stated by the student’s academic department. Students may occasionally be permitted by their advisor to take undergraduate courses. However, undergraduate courses do not count toward a graduate degree and may affect a student’s eligibility to receive federal financial aid. Undergraduate courses do not count toward the graduate-level course load requirement for full-time students.

Dissertation and Dissertation Continuation

Once program requirements are met for the PhD candidacy, PhD candidates must register for Dissertation Term 1 (XXXX 9990) and Dissertation Term 2 (XXXX 9991). Candidates must then register for Dissertation Continuation (XXXX 9996) in each subsequent semester (excluding the summer term) until the dissertation is complete and approved by the Graduate School of Engineering. Students completing their dissertation in the summer term must register for Dissertation Continuation. Dissertation and Dissertation Continuation confer full-time status.

MS Thesis Option

Master’s degree students who are completing a thesis must register for 4 semester hours of Master’s Project (XXXX 7945) followed by 4 semester hours of Thesis (XXXX 7990) for a total of 8 semester hours, unless otherwise stated by the program’s requirements. Students who have not completed their thesis but have already registered for the required number of thesis hours may register for Thesis Continuation in their last semester (including summer terms). There is a 1-semester-hour tuition charge for Thesis Continuation. Thesis Continuation may only be completed once.

Petitions

Petitions are required in all cases where a student is requesting a change or exception to their current program or student status for the Graduate School of Engineering to maintain a complete and accurate record for all students.

Dissertation Committee

A dissertation committee shall include a minimum of three members, or four members if there are two co-advisors. At least three committee members should hold a doctorate or an appropriate terminal degree for the discipline, and at least two shall be full-time Northeastern University faculty.

At least two committee members shall hold some appointment in the department that offers the degree that the student is seeking. At least one member of the committee must not have a primary appointment in the department that offers the degree that the student is seeking.

The chair of the dissertation committee, who is assumed to be the advisor, shall be a full-time tenured or tenure-track member of the faculty of Northeastern, shall hold some appointment in the department that offers the degree that the student is seeking, and will hold a doctorate or an appropriate terminal degree for the discipline.

Research and teaching faculty may serve as the chair of the dissertation committee with departmental approval. In this case, at least two members of the committee must be tenured or tenure-track full-time Northeastern faculty. Exceptions to this requirement may be granted by the dean (or designee) based on the qualifications and experience of the faculty member who would serve as chair.

Graduate Student Grievance Policy

Introduction

This policy describes steps a graduate student should follow to submit a grievance.

Students should first attempt to resolve an issue through informal means, for example, by communicating with appropriate faculty members or the program director. If the issue is not resolved, students should follow the steps described below.

Students who believe that they have been erroneously, capriciously, inappropriately, or otherwise unfairly treated in an academic or cooperative education determination should follow the appeals procedure described in the COE Graduate Appeals Policy or the COE Cooperative Education Appeals Policy, respectively. Subsequent academic appeals can be submitted by following the University Academic Appeals Policy and Procedure.

Northeastern University is committed to providing a living, learning, and work environment that is safe and free from discrimination and harassment. This includes all allegations of discrimination including those based on race, color, religion, religious creed, genetic information, sex (including pregnancy or pregnancy-related condition, sexual assault, sexual harassment, stalking, domestic violence), gender, gender identity, sexual orientation, age, national origin, ancestry, and veteran or disability status. If a student makes a claim of discriminatory acts prohibited by law or by university policy, the grievance shall first be pursued through the Office of University Equity and Compliance and its procedures. When this has been completed, any aspects of the grievance that remain unresolved may then be brought to the grievance procedure.

Graduate students can contact the Ombuds for Graduate Students that offers confidential, impartial, and informal assistance to graduate students who have concerns related to their university experience.

Note that the college prohibits retaliation against a student for filing a grievance.

Grievance Procedure

A graduate student who would like to complain about their treatment by a College of Engineering employee (faculty or staff) may submit a grievance. A written description of the complaint should be submitted within 60 days of the alleged activity. The description should state the exact nature of the grievance, against whom it is filed, and the remedy sought.

The student should submit the complaint to the chair of the department that houses the student's primary program of study and to the associate dean for graduate education. The chair shall review the complaint, shall give any employees named in the grievance an opportunity to share relevant information, may gather additional information, and shall send a written response to the student and the associate dean for graduate education within two weeks.

If the student is not satisfied by the department chair's response, the student may submit the complaint to the associate dean for graduate education within two weeks. The associate dean shall review all available information and submit a written response to the student within two weeks.

If the student is not satisfied by the associate dean's decision, the student may submit the complaint to the dean within two weeks. The dean will review all available information and submit a written response to the student within two weeks.

PhD Student Progress and Review

Formal Requirements

The formal requirements for the PhD degree include the following milestones:

1. Completing required coursework.
2. Achieving candidacy, as determined by degree program. May be achieved through qualifying examinations, comprehensive examination(s), and/or an oral defense of the dissertation proposal.
3. Identifying a faculty research advisor.
4. Forming a dissertation committee.
5. Writing and completing a successful oral defense of the dissertation proposal before the PhD committee.

6. Completing a successful oral defense of dissertation before the PhD committee.
7. Approval of written dissertation by dissertation committee and Graduate School of Engineering.

Time Limits

Departments shall define standards for satisfactory performance progress for PhD students that include the following time limits:

DIRECT-ENTRY PHD STUDENTS

1. Candidacy must be achieved within three years of entering the PhD program.
2. The degree must be completed within seven years of entering the PhD program.

ADVANCED-ENTRY PHD STUDENTS

1. Candidacy must be achieved within three years of entering the PhD program.
2. The degree must be completed within five years of entering the PhD program.

Performance Progress

Departments shall establish a review process by which the performance progress of every PhD student is evaluated not more than once per semester and at least annually. As part of this review, students should submit information **that must include achievement of milestones** and could include descriptions of their plans, achievements, progress toward goals, transcripts, CV, publications, conferences attended, recognition they have received, and awards. The review process must include feedback from the student's faculty advisor.

If a department finds that a PhD student is not making satisfactory progress, the student shall be placed on performance probation. Members of the department shall work with the student to develop a performance improvement plan that includes specific actions the student should take to return to satisfactory progress. The performance progress of each PhD student on performance probation shall be reviewed by their department no earlier than one semester and no later than one year after being placed on probation. If a student on performance probation is again found to be not making satisfactory progress, the student shall be dismissed from their degree program. If a student on performance probation is found to be making satisfactory progress, the student shall leave performance probation status.

A copy of the performance progress review and performance improvement plan, if applicable, shall be submitted to the student. For all students, the result of the performance progress review shall be submitted to the Graduate School of Engineering. For all students who receive an unsatisfactory review, a summary of the performance progress review and performance improvement plan shall be submitted to the Graduate School of Engineering. Students dismissed from their program will be notified by the Graduate School of Engineering. A student who is dismissed from their program may submit an appeal through the college's graduate appeals process.

For the purposes of determining the timing of performance reviews specified by this policy, the summer first-half and summer second-half semesters shall collectively be considered one semester.

Program Completion

In order to earn a degree in the graduate program in which a student is enrolled, a student must complete all program and departmental requirements in a satisfactory manner.

A student must attain a cumulative grade-point average of 3.000 or higher in all courses applied toward that degree. A student must also earn a grade of C or higher in all required core courses. Please note that individual programs may have additional requirements.

Reenrollment Policy for Full-time Students

Students who enroll and complete at least one graduate engineering course can apply to their academic department to take an official leave of absence from the time they complete said course(s) and be automatically readmitted without department review. Automatic readmission applies only to the original program and concentration (if applicable) and only for students who took an official approved leave of absence. Catalog year of entry does not change and students must complete the curriculum requirements outlined in the Northeastern University *Graduate Catalog* for their original academic year of admission.

If a student without official leave of absence approval does not enroll in classes for two consecutive fall/spring semesters, they will be declared inactive.

To return from inactive status, a student must submit a petition to regain active student status. If the petition is approved by the department and the Graduate School of Engineering, the record will be moved back to active, and the student may register for courses. If the petition is denied, the Graduate School of Engineering will initiate a withdrawal from Northeastern.

If an inactive student does not enroll in classes for four total consecutive fall/spring semesters, the Graduate School of Engineering will initiate a withdrawal from Northeastern. In the case of withdrawal, a student will be required to submit a new admission application for graduate studies without guarantee of readmission. If the student is admitted after being withdrawn, they will be admitted into the current catalog year and must meet the curriculum requirements in the current *Graduate Catalog*.

In cases where the student has seven or more years of nonenrollment, the graduate advisor in the Graduate School of Engineering shall initiate the process by contacting the graduate studies chair/program director on behalf of the student to confirm the content in the course(s) is still relevant to the current degree program. If the courses are confirmed to still be relevant, the graduate advisor shall submit a Waiver Request form with a copy of the course confirmation, the student's academic transcript, and any additional supporting documents to the graduate studies chair/program director and associate dean for graduate education for review and final approval. If the waiver is approved, the graduate advisor will send the waiver to the Office of the University Registrar for the course(s) to be applied to the student's degree audit.

Thesis Policy

This policy applies to all full-time and part-time graduate students pursuing a master's degree program or students in the PlusOne accelerated master's degree program in the College of Engineering.

Students that pursue the thesis option in a master's degree will enroll in 4 semester hours of Master's Project followed by 4 semester hours of Thesis, unless otherwise stated by the program's requirements.

If a student is unable to complete the thesis requirements after registering for the Thesis course (7990), they should consult their academic advisor to determine the appropriate course for the following term to maintain their registration status while completing the thesis requirements.

In addition to completing the Master's Project and Thesis courses, students must successfully complete the thesis submission process by the specified deadlines, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Students pursuing the thesis option may switch to a Master's Project or coursework-only option after completing the Master's Project course. If a student changes from the thesis option to Master's Project, no action is needed. If a student changes from the thesis option to coursework option, they may petition to count up to 4 semester hours of Master's Project as elective credit toward the coursework option. This petition will be reviewed by the program contact, who may verify the work with the thesis advisor. If the program determines that the Master's Project semester hours cannot count toward the new coursework option requirements, students may need to take additional courses at their own expense to meet the degree requirements.

Bioengineering

Website (<https://bioe.northeastern.edu/>)

Abraham Joy, PhD

Professor and Chair

206 Interdisciplinary Science and Engineering Complex

a.joy@northeastern.edu

The Department of Bioengineering is driven by the conviction that the interface of engineering and medicine will be one of the great intellectual adventures of the 21st century. To prepare students for this adventure, the department strives to create an atmosphere of innovation and creativity that fosters excellence in instruction and research and provides a foundation for programs that drive forward the cutting edge of knowledge while establishing translational collaborations with clinical and industrial researchers.

Bioengineering is built on the recognition that engineering of biological systems, or tools that interface with living systems, requires a multidisciplinary approach considering mechanical, electrical, chemical, and materials processes. Students with backgrounds from biochemistry to computer science, and many fields in between, are attracted to bioengineering as a field with the potential to make a great impact on human health. The MS and PhD programs are designed to integrate students with very different backgrounds and provide them with the coursework and research experience that will take advantage of and build on their unique experiences.

Recognizing the breadth of disciplines that contribute to bioengineering, the MS program allows students to choose a concentration to develop deep expertise in an area of particular interest, selecting from biomechanics and mechanobiology; biomedical devices and bioimaging; molecular, cell, and tissue engineering; or systems, synthetic, and computational bioengineering. The MS program encourages individual research through an optional one-semester master's project or a master's project followed by a master's thesis.

The PhD program spans research areas for which the department has particular strengths. The PhD program in Boston specializes in biomechanics and mechanobiology; biomedical devices and bioimaging; molecular, cell, and tissue engineering; and systems, synthetic, and computational bioengineering. The PhD program at the Roux Institute in Portland specializes in artificial intelligence in translational healthcare. PhD coursework is designed to strengthen student backgrounds in the areas most relevant to their interests.

Mission of the Department

The mission of the Department of Bioengineering is the education of students in the fundamental principles and practice of bioengineering and, through basic and applied research, the creation of new knowledge at the interface of engineering and medicine to support development of new technologies for improvement of human health and healthcare.

Overview of Programs Offered

The Department of Bioengineering offers a Master of Science and a Doctor of Philosophy in Bioengineering. The MS degree is offered as a full-time or part-time program. The PhD degree program is only offered as a full-time program.

Candidates pursuing an MS or PhD are able to select thesis topics from a diverse range of faculty research. New graduate students may learn about ongoing research topics from individual faculty members, faculty websites, and bioengineering seminars.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 1349) in combination with the MS degree.

Programs

Doctor of Philosophy (PhD)

- Bioengineering (Boston) (p. 471)
- Bioengineering (Portland) (p. 479)
- Interdisciplinary Engineering (Boston) (p. 486)

Master of Science (MS)

- Robotics, MS (Boston) (p. 180)

Master of Science in Bioengineering (MSBioE)

- Bioengineering (Boston) (p. 493)
- Bioengineering —Connect (Boston) (p. 498)

Bioengineering, PhD (Boston)

Biology can inspire engineering. Increasingly, discoveries in the life sciences reveal processes, complexity, and control without analogy in the world of traditional engineering. Current methods of producing nanoscale control over molecules cannot reproduce the organization found in even the simplest organisms. Energy capture, robust control, remediation, and self-assembly are all employed by biosystems with efficiency unparalleled by anything in today's laboratories. At the same time, traditional engineering disciplines struggle to find new approaches to the complex challenges of 21st-century technology. The last 50 years of basic life science research have gradually revealed the layers of complexity intrinsic to biological processes, unmasking the fundamental underpinnings on which biological systems are constructed. Bioinspired engineering has the potential to transform the technological landscape of the 21st century. Astonishingly, it represents merely one of the myriad opportunities presented at the interface of biology and engineering.

The field of bioengineering is broad and includes all research at the interface of engineering and biology—this includes bioprocesses, environmental microbiology, biomaterials and tissue engineering, bioelectricity, biomechanics, biomedical and biological imaging, nanotechnology in medicine and the environment, and engineering design for human interfacing. At Northeastern University, bioengineering PhD students have an opportunity to be trained to appreciate advances in bioengineering across a wide range of disciplines while they perform highly focused and cutting-edge bioengineering research with one of our faculty members.

The PhD in Bioengineering program reflects departmental research strengths in multiple areas. Students accepted to the bioengineering program will undertake a rigorous core curriculum in basic bioengineering science, followed by a flexible selection of electives tailored to their dissertation research.

Research Areas

There are four key areas of research strength in our department.

AREA 1—BIOMEDICAL DEVICES AND BIOIMAGING

The Biomedical Devices and Bioimaging track reflects Northeastern's outstanding research profile in developing transformative and translational instrumentation and algorithms to help understand biological processes and disease. Our department has active federally funded research spanning across a broad spectrum of relevant areas in instrument design, contrast agent development, and advanced computational modeling and reconstruction methods. Example research centers and laboratories include the Institute for Chemical Imaging of Living Systems (<https://coe.northeastern.edu/coe-research/research-centers-institutes/institute-for-chemical-imaging-of-living-systems/>), the Translational Biophotonics Cluster (<https://sites.google.com/view/tbpclosternu/home/>), and the B-SPIRAL signal processing group (<https://web.northeastern.edu/spiral/>).

AREA 2—BIOMECHANICS AND MECHANOBIOLOGY

Motion, deformation, and flow of biological systems in response to applied loads elicit biological responses at the molecular and cellular levels that support the physiological function of tissues and organs and drive their adaptation and remodeling. To study these complex interactions, principles of solid, fluid, and transport mechanics must be combined with measures of biological

function. The biomechanics and mechanobiology research area embraces this approach and leverages the strong expertise of Northeastern faculty attempting to tie applied loads to biological responses at multiple length and time scales. Northeastern faculty working in this field are centered around the Institute for Mechanobiology (<https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fmechanobiology.northeastern.edu%2F&data=05%7C02%7Cc.pridmore%40northeastern.edu%7C4de345a4039f4567acef08dd3690df82%7Ca8eec281aaa34daeac9b9a398b9215e7%7C0%7C0%7C638726718025303787%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIlwLjAuMDAwMCIslIAiOiJXaW4zMilslkFOljoitWFBpCisldUljoyfQ%3D%3D%7C0%7C%7C%7C&sdata=LwBJwtZbgsITmbIbUn07RsMyK5KbYtSowda69UI6CRo%3D&reserved=0>), whose mission is to accelerate mechanobiology discoveries and technologies to enhance human health and advance medicine.

AREA 3—MOLECULAR, CELL, AND TISSUE ENGINEERING

Principles for engineering living cells and tissues are essential to address many of the most significant biomedical challenges facing our society today. These application areas include engineering biomaterials to coax and enable stem cells to form functional tissue or to heal damaged tissue; designing vehicles for delivering genes and therapeutics to reach specific target cells to treat a disease; and uncovering therapeutic strategies to curb pathological cell behaviors and tissue phenotypes. At a more fundamental level, the field is at the nascent stages of understanding how cells make decisions in complex microenvironments and how cells interact with each other and their surrounding environment to organize into complex three-dimensional tissues. Advances will require multiscale experimental, computational, and theoretical approaches spanning molecular-cellular-tissue levels and integration of molecular and physical mechanisms, including the role of mechanical forces.

AREA 4—SYSTEMS, SYNTHETIC, AND COMPUTATIONAL BIOENGINEERING

Research groups in systems, synthetic, and computational bioengineering apply engineering principles to model and understand complex biological systems, including differentiation and development, pathogenesis and cancer, and learning and behavior. This involves designing and implementing methods for procuring quantitative and sometimes very large datasets, as well as developing theoretical models and computational tools for interpreting these data. Deciphering the workings of a biological system allows us to identify potential biomarkers and drug targets, to develop protocols for personalized medicine, and more. In addition, we use the design principles of biological systems we discover to engineer and refine new synthetic biological systems for clinical, agricultural, environmental, and energy applications.

Degree Requirements

Completion of the PhD degree requires students to successfully complete the following requirements:

CURRICULUM

The curriculum comprises a strong core of fundamental courses that is coupled with flexible choices of restricted and unrestricted technical electives to provide depth in a particular field of study. The detailed course requirements are outlined below.

For students possessing a baccalaureate in a suitable quantitative or technical field before entering the PhD program, the required course distribution is shown in the table below:

Requirements	Credits
Required core courses	12
Restricted technical electives	8
Unrestricted technical electives	12
Advanced seminar (four semesters)	
Dissertation	
Minimum semester hours required	32

The curriculum for PhD students with “advanced standings,” i.e., students with an MS degree in relevant engineering areas awarded at a qualified institution, will be selected from the available core and elective courses under the guidance of the program director and the student’s primary advisor. Completion of the PhD degree with an advanced standing requires a minimum of 16 semester hours of coursework to be approved by the graduate director and a completed PhD dissertation.

Requirements	Credits
Required core courses	8
Advisor-approved coursework	8
Advanced seminar (four semesters)	
Dissertation	
Minimum semester hours required	16

QUALIFYING EXAM (WRITTEN AND ORAL)

To qualify to continue in the PhD program, students must pass the bioengineering qualifying examination in the most relevant of the four department research areas. Students will prepare a seven-page written document that will be distributed to the committee before the oral examination. Details of the formal qualification exam procedure and timing are available in the Graduate Handbook (<https://bioe.northeastern.edu/community/resources-for-current-students/>). In addition, satisfactory research progress and academic standing are required to pass the exam. The qualifying exam is normally taken in the student’s second year.

QUALIFYING EXAM COMMITTEE

The qualifying examination committee is composed of three members of the Department of Bioengineering faculty. At least two of three committee members will be from the student's research area. The student's primary research advisor may not sit on the qualifying exam committee.

PHD DISSERTATION COMMITTEE

Students normally form their dissertation committee within two years of joining the PhD program. The dissertation committee is composed of a minimum of three members, two of whom must be core faculty from the Department of Bioengineering. The student's primary advisor will be a member of and chair the dissertation committee. This advisor must be a member of the core bioengineering faculty or a faculty member from another department who has an affiliation with the bioengineering department. Students are required to meet annually with their PhD dissertation committee to ensure satisfactory research progress.

ANNUAL COMMITTEE MEETINGS AND DISSERTATION PROPOSALS

PhD students must hold their first committee meetings no later than their third year. The first committee meeting requires the student to write a dissertation proposal in the form of an NIH-style R21 proposal research plan that will be distributed to their dissertation committee at least one week prior to the meeting. Thereafter, students are expected to hold annual progress updates with their committee. At the penultimate committee meeting (which must be held at least four months prior to the dissertation defense), the student will prepare and present a final proposal document to the committee. Successful defense of this proposal will allow the student to progress to the PhD dissertation defense.

PHD DISSERTATION DEFENSE

PhD candidates must satisfactorily complete and defend a dissertation describing original research in bioengineering in an open presentation to the Northeastern bioengineering community, followed by a closed meeting with their dissertation committee in which they are expected to defend their work and answer all relevant questions regarding that work, its significance, and its relationship to ongoing work across the broader research community.

DISSERTATION COURSE REQUIREMENTS

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters (may include full summer term) for Dissertation Term 1 (BIOE 9990) and Dissertation Term 2 (BIOE 9991). Upon completion of this sequence, the student must then register for Dissertation Continuation (BIOE 9996) every semester (in each fall and spring term and also in the summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (BIOE 9996) until they fulfill the two-semester sequence of Dissertation Term 1 (BIOE 9990) and Dissertation Term 2 (BIOE 9991).

PhD students who have completed the majority of their coursework and not yet reached PhD candidacy should register for Research (BIOE 9986) in a section for which their research or academic advisor is listed as the instructor in the online registration system.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying examination (within two years of entry)
Dissertation committee
Annual committee meetings
Area examination (dissertation prospectus/proposal)
Dissertation defense

Core Requirements

Code	Title	Hours
Seminar		
BIOE 7390	Seminar (Register and complete two semesters)	0
BIOE 7391	Student Seminar (Register and complete once in second year and once in fourth year)	0
Required Core		
BIOE 6100	Medical Physiology	4
BIOE 6200	Mathematical Methods in Bioengineering	4
BIOE 7000	Principles of Bioengineering	4
Restricted Bioengineering Technical Electives		
Complete 8 semester hours from the following:		8
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5235	Biomedical Imaging	
BIOE 5410	Molecular Bioengineering	
BIOE 5411	Applied Molecular Bioengineering	
BIOE 5420	Cellular Engineering	

BIOE 5430	Principles and Applications of Tissue Engineering
BIOE 5440	The Cell as a Machine
BIOE 5630	Physiological Fluid Mechanics
BIOE 5640	Computational Biomechanics
BIOE 5648	Biomedical Optics
BIOE 5650	Multiscale Biomechanics
BIOE 5660	Integrative Mechanobiology
BIOE 5710	Experimental Systems and Synthetic Bioengineering
BIOE 5711	Advanced Experimental Systems and Synthetic Bioengineering
BIOE 5720	Physical Bioengineering
BIOE 5750	Modeling and Inference in Bioengineering
BIOE 5770	Machine Learning Methods in Biology and Health
BIOE 5810	Design of Biomedical Instrumentation
BIOE 5820	Biomaterials
BIOE 5860	Engineering Approaches to Precision Medicine I
BIOE 5870	Engineering Approaches to Precision Medicine II
ME 5665	Musculoskeletal Biomechanics

Technical Electives

Complete 12 semester hours from the electives listed below.

12

Electives Course List

Any course in the following list will serve as an elective course, provided the course is offered and the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the faculty advisor.

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	
BIOE 5060	Special Topics in Bioengineering	
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5235	Biomedical Imaging	
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
BIOE 5410	Molecular Bioengineering	
BIOE 5411	Applied Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5450	Stem Cell Engineering	
BIOE 5510	Bioengineering Products/Technology Commercialization	
BIOE 5520	Bioengineering Design for Robotic Rehabilitation	
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	
BIOE 5648	Biomedical Optics	
BIOE 5650	Multiscale Biomechanics	
BIOE 5660	Integrative Mechanobiology	
BIOE 5710	Experimental Systems and Synthetic Bioengineering	
BIOE 5711	Advanced Experimental Systems and Synthetic Bioengineering	
BIOE 5720	Physical Bioengineering	
BIOE 5750	Modeling and Inference in Bioengineering	
BIOE 5760	Method and Logic in Systems Biology and Bioengineering	
BIOE 5770	Machine Learning Methods in Biology and Health	
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
BIOE 5850	Design of Implants	
BIOE 5860	Engineering Approaches to Precision Medicine I	

BIOE 5870	Engineering Approaches to Precision Medicine II
BIOE 5880	Computational Methods in Systems Bioengineering
BIOE 7210	A Data Science Toolkit for Human Neuroscience Research
BIOL 5543	Stem Cells and Regeneration
BIOL 5601	Multidisciplinary Approaches in Motor Control
BIOL 6299	Molecular Cell Biology for Biotechnology
BIOL 6300	Biochemistry
BIOL 6301	Molecular Cell Biology
CAEP 6202	Research, Evaluation, and Data Analysis
CHEM 5612	Principles of Mass Spectrometry
CHEM 5620	Protein Chemistry
CHEM 5621	Principles of Chemical Biology
CHEM 5638	Molecular Modeling
CHME 5630	Biochemical Engineering
CHME 5632	Advanced Topics in Biomaterials
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5310	Computer Graphics
CS 5330	Pattern Recognition and Computer Vision
CS 5335	Robotic Science and Systems
CS 5340	Computer/Human Interaction
CS 5400	Principles of Programming Language
CS 5600	Computer Systems
CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6410	Compilers
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
EECE 5606	Micro- and Nanofabrication
EECE 5642	Data Visualization
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7200	Linear Systems Analysis
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7271	Computational Methods in Electromagnetics
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
HLTH 5600	Introduction to Patient Safety
HLTH 5610	Patient Safety Science
HLTH 5630	Quality Improvement in Patient Safety
HLTH 5800	AI Across the Health Sciences
HSCI 5150	Methods for Observational Research 1

HSCI 5180	Phenotyping
HSCI 5190	Cohort Building
IE 7315	Human Factors Engineering
ME 5650	Advanced Mechanics of Materials
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method 1
ME 5658	Continuum Mechanics
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7238	Finite Element Method 2
ME 7275	Essentials of Fluid Dynamics
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
OR 6205	Deterministic Operations Research
PHSC 5100	Concepts in Pharmaceutical Science
PHSC 6290	Biophysical Methods in Drug Discovery
PHTH 5210	Biostatistics in Public Health
PHTH 5214	Environmental Health
PHTH 6440	Advanced Methods in Biostatistics
PHYS 5116	Network Science 1
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7321	Computational Physics
PHYS 7741	Physics of Biological Processes and Living Systems 2
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems
PT 5138	Neuroscience
PT 5139	Lab for PT 5138
PT 5150	Motor Control, Development, and Learning
PT 5151	Lab for PT 5150

Dissertation

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review

Qualifying examination (within two years of entry)

Dissertation committee

Area examination (dissertation prospectus/proposal)

Dissertation defense

Core Requirements

Code	Title	Hours
Seminar		
BIOE 7390	Seminar (Register and complete two semesters)	0

BIOE 7391	Student Seminar (Register and complete once in second year and once in fourth year)	0

Required Core

BIOE 6200	Mathematical Methods in Bioengineering	4
BIOE 7000	Principles of Bioengineering	4

Approved Coursework

Complete 8 semester hours from the electives listed below.		8

Electives Course List

Any course in the following list will serve as an elective course, provided the course is offered and the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the faculty advisor.

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	
BIOE 5060	Special Topics in Bioengineering	
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5235	Biomedical Imaging	
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
BIOE 5410	Molecular Bioengineering	
BIOE 5411	Applied Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5450	Stem Cell Engineering	
BIOE 5510	Bioengineering Products/Technology Commercialization	
BIOE 5520	Bioengineering Design for Robotic Rehabilitation	
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	
BIOE 5648	Biomedical Optics	
BIOE 5650	Multiscale Biomechanics	
BIOE 5660	Integrative Mechanobiology	
BIOE 5710	Experimental Systems and Synthetic Bioengineering	
BIOE 5711	Advanced Experimental Systems and Synthetic Bioengineering	
BIOE 5720	Physical Bioengineering	
BIOE 5750	Modeling and Inference in Bioengineering	
BIOE 5760	Method and Logic in Systems Biology and Bioengineering	
BIOE 5770	Machine Learning Methods in Biology and Health	
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
BIOE 5850	Design of Implants	
BIOE 5860	Engineering Approaches to Precision Medicine I	
BIOE 5870	Engineering Approaches to Precision Medicine II	
BIOE 5880	Computational Methods in Systems Bioengineering	
BIOE 6100	Medical Physiology	
BIOE 7210	A Data Science Toolkit for Human Neuroscience Research	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
BIOL 6300	Biochemistry	
BIOL 6301	Molecular Cell Biology	
CAEP 6202	Research, Evaluation, and Data Analysis	
CHEM 5620	Protein Chemistry	
CHEM 5621	Principles of Chemical Biology	
CHEM 5638	Molecular Modeling	
CHME 5630	Biochemical Engineering	

CHME 5632	Advanced Topics in Biomaterials
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5310	Computer Graphics
CS 5330	Pattern Recognition and Computer Vision
CS 5335	Robotic Science and Systems
CS 5340	Computer/Human Interaction
CS 5400	Principles of Programming Language
CS 5600	Computer Systems
CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6410	Compilers
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
EECE 5606	Micro- and Nanofabrication
EECE 5642	Data Visualization
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7200	Linear Systems Analysis
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7271	Computational Methods in Electromagnetics
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
HLTH 5600	Introduction to Patient Safety
HLTH 5610	Patient Safety Science
HLTH 5630	Quality Improvement in Patient Safety
HLTH 5800	AI Across the Health Sciences
HSCI 5150	Methods for Observational Research 1
HSCI 5180	Phenotyping
HSCI 5190	Cohort Building
IE 7315	Human Factors Engineering
ME 5650	Advanced Mechanics of Materials
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method 1
ME 5658	Continuum Mechanics
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7238	Finite Element Method 2
ME 7275	Essentials of Fluid Dynamics

NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
OR 6205	Deterministic Operations Research
PHSC 5100	Concepts in Pharmaceutical Science
PHSC 6290	Biophysical Methods in Drug Discovery
PTH 5210	Biostatistics in Public Health
PTH 5214	Environmental Health
PTH 6440	Advanced Methods in Biostatistics
PHYS 5116	Network Science 1
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7321	Computational Physics
PHYS 7741	Physics of Biological Processes and Living Systems 2
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems
PT 5138	Neuroscience
PT 5139	Lab for PT 5138
PT 5150	Motor Control, Development, and Learning
PT 5151	Lab for PT 5150

Dissertation

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Bioengineering, PhD (Portland)

Biology can inspire engineering. Increasingly, discoveries in the life sciences reveal processes, complexity, and control without analogy in the world of traditional engineering. Current methods of producing nanoscale control over molecules cannot reproduce the organization found in even the simplest organisms. Energy capture, robust control, remediation, and self-assembly are all employed by biosystems with efficiency unparalleled by anything in today's laboratories. At the same time, traditional engineering disciplines struggle to find new approaches to the complex challenges of 21st-century technology. The last 50 years of basic life science research have gradually revealed the layers of complexity intrinsic to biological processes, unmasking the fundamental underpinnings on which biological systems are constructed. Bioinspired engineering has the potential to transform the technological landscape of the 21st century. Astonishingly, it represents merely one of the myriad opportunities presented at the interface of biology and engineering.

The field of bioengineering is broad and includes all research at the interface of engineering and biology—this includes bioprocesses, environmental microbiology, biomaterials and tissue engineering, bioelectricity, biomechanics, biomedical and biological imaging, nanotechnology in medicine and the environment, and engineering design for human interfacing. At Northeastern University, bioengineering PhD students have an opportunity to be trained to appreciate advances in bioengineering across a wide range of disciplines while they perform highly focused and cutting-edge bioengineering research with one of our faculty members.

The PhD in Bioengineering program reflects departmental research strengths in multiple areas. Students accepted to the bioengineering program will undertake a rigorous core curriculum in basic bioengineering science, followed by a flexible selection of electives tailored to their dissertation research.

Research Focus

ARTIFICIAL INTELLIGENCE IN TRANSLATIONAL HEALTHCARE AT THE ROUX INSTITUTE (AI-TH@ROUX)

Translational healthcare is a discipline of biomedical research that seeks to improve the health of individuals and communities by translating research findings into diagnostic tools, medicine, and other therapies. Artificial Intelligence in Translational Healthcare at the Roux Institute uses methods of high-performance computing, data science, and modeling to achieve these goals. AI-TH@Roux builds on core research strengths at the Roux Institute in areas that include machine learning, dynamical systems modeling, biostatistics, human-computer and human-AI interactions, entrepreneurship, and business partnership with not-for-profit research institutions and companies. This research area collaborates closely with Bouvé College of Health Sciences—to further enhance connection to clinical practices and policies—and with Khoury College of Computer Sciences—to further strengthen students' computational literacy.

DEGREE REQUIREMENTS

Completion of the PhD degree requires students to successfully complete the requirements described below.

Curriculum

The curriculum comprises a strong core of fundamental courses that is coupled with flexible choices of restricted and unrestricted technical electives to provide depth in a particular field of study. The detailed course requirements are outlined below.

For students possessing a baccalaureate in a suitable quantitative or technical field before entering the PhD program, the required course distribution is shown in the table below:

Requirements	Credits
Required core courses	12
Restricted technical electives	8
Unrestricted technical electives	12
Advanced seminar (four semesters)	
Dissertation	
Minimum semester hours required	32

The curriculum for PhD students with advanced standings, i.e., students with an MS degree in relevant engineering areas awarded at a qualified institution, will be selected from the available core and elective courses under the guidance of the program director and the student's primary advisor. Completion of the PhD degree with an advanced standing requires a minimum of 16 semester hours of coursework to be approved by the graduate director and a completed PhD dissertation.

Requirements	Credits
Required core courses	8
Advisor-approved coursework	8
Advanced seminar (four semesters)	
Dissertation	
Minimum semester hours required	16

Qualifying Exam (Written and Oral)

To qualify to continue in the PhD program, students must pass the bioengineering qualifying examination in their research area. Students will prepare a seven-page written document that will be distributed to the committee before the oral examination. Details of the formal qualification exam procedure and timing are available in the Graduate Handbook (<https://bioe.northeastern.edu/community/resources-for-current-students/>). In addition, satisfactory research progress and academic standing are required to pass the exam. The qualifying exam is normally taken in the student's second year.

Qualifying Exam Committee

The qualifying examination committee is composed of three members of the Department of Bioengineering faculty. At least two of three committee members will be from the student's research area. The student's primary research advisor may not sit on the qualifying exam committee.

PhD Dissertation Committee

Students normally form their dissertation committee within two years of joining the PhD program. The dissertation committee is composed of a minimum of three members, two of whom must be core faculty from the Department of Bioengineering. The student's primary advisor will be a member of and chair the dissertation committee. This advisor must be a member of the core bioengineering faculty or a faculty member from another department who has an affiliation with the bioengineering department. Students are required to meet annually with their PhD dissertation committee to ensure satisfactory research progress.

Annual Committee Meetings and Dissertation Proposals

PhD students must hold their first committee meetings no later than their third year. The first committee meeting requires the student to write a dissertation proposal in the form of an NIH-style R21 proposal research plan that will be distributed to their dissertation committee at least one week prior to the meeting. Thereafter, students are expected to hold annual progress updates with their committee. At the penultimate committee meeting (which must be held at least four months prior to the dissertation defense), the student will prepare and present a final proposal document to the committee. Successful defense of this proposal will allow the student to progress to the PhD dissertation defense.

PhD Dissertation Defense

PhD candidates must satisfactorily complete and defend a dissertation describing original research in bioengineering in an open presentation to the Northeastern bioengineering community, followed by a closed meeting with their dissertation committee in which they are expected to defend their work and answer all relevant questions regarding that work, its significance, and its relationship to ongoing work across the broader research community.

Dissertation Course Requirements

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters (may include full summer term) for Dissertation Term 1 (BIOE 9990) and Dissertation Term 2 (BIOE 9991). Upon completion of this sequence, the student must then register for Dissertation Continuation (BIOE 9996) every semester (in each fall and spring term and also in the

summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (BIOE 9996) until they fulfill the two-semester sequence of Dissertation Term 1 (BIOE 9990) and Dissertation Term 2 (BIOE 9991).

PhD students who have completed the majority of their coursework and not yet reached PhD candidacy should register for Research (BIOE 9986) in a section for which their research or academic advisor is listed as the instructor in the online registration system.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review

Qualifying examination (within two years of entry)

Dissertation committee

Annual committee meetings

Area examination (dissertation prospectus/proposal)

Dissertation defense

Core Requirements

Code	Title	Hours
Seminar		
BIOE 7390	Seminar (Register and complete two semesters)	0
BIOE 7391	Student Seminar (Register and complete once in second year and once in fourth year)	0
Required Core		
BIOE 6100	Medical Physiology	4
BIOE 6200	Mathematical Methods in Bioengineering	4
BIOE 7000	Principles of Bioengineering	4
Restricted Bioengineering Technical Electives		
Complete 8 semester hours from the following:		8
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5750	Modeling and Inference in Bioengineering	
BIOE 5770	Machine Learning Methods in Biology and Health	
BIOE 5860	Engineering Approaches to Precision Medicine I	
BIOE 5870	Engineering Approaches to Precision Medicine II	
BIOE 5880	Computational Methods in Systems Bioengineering	
Technical Electives		
Complete 12 semester hours from the electives listed below.		12

Electives Course List

Any course in the following list will serve as an elective course, provided the course is offered and the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the faculty advisor.

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	
BIOE 5060	Special Topics in Bioengineering	
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5235	Biomedical Imaging	
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
BIOE 5410	Molecular Bioengineering	
BIOE 5411	Applied Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5450	Stem Cell Engineering	
BIOE 5510	Bioengineering Products/Technology Commercialization	
BIOE 5520	Bioengineering Design for Robotic Rehabilitation	
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	

BIOE 5648	Biomedical Optics
BIOE 5650	Multiscale Biomechanics
BIOE 5660	Integrative Mechanobiology
BIOE 5710	Experimental Systems and Synthetic Bioengineering
BIOE 5711	Advanced Experimental Systems and Synthetic Bioengineering
BIOE 5720	Physical Bioengineering
BIOE 5750	Modeling and Inference in Bioengineering
BIOE 5760	Method and Logic in Systems Biology and Bioengineering
BIOE 5770	Machine Learning Methods in Biology and Health
BIOE 5800	Systems, Signals, and Controls for Bioengineers
BIOE 5810	Design of Biomedical Instrumentation
BIOE 5820	Biomaterials
BIOE 5850	Design of Implants
BIOE 5860	Engineering Approaches to Precision Medicine I
BIOE 5870	Engineering Approaches to Precision Medicine II
BIOE 5880	Computational Methods in Systems Bioengineering
BIOE 7210	A Data Science Toolkit for Human Neuroscience Research
BIOL 5543	Stem Cells and Regeneration
BIOL 5601	Multidisciplinary Approaches in Motor Control
BIOL 6299	Molecular Cell Biology for Biotechnology
BIOL 6300	Biochemistry
BIOL 6301	Molecular Cell Biology
CAEP 6202	Research, Evaluation, and Data Analysis
CHEM 5612	Principles of Mass Spectrometry
CHEM 5620	Protein Chemistry
CHEM 5621	Principles of Chemical Biology
CHEM 5638	Molecular Modeling
CHME 5630	Biochemical Engineering
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5310	Computer Graphics
CS 5330	Pattern Recognition and Computer Vision
CS 5335	Robotic Science and Systems
CS 5340	Computer/Human Interaction
CS 5400	Principles of Programming Language
CS 5600	Computer Systems
CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6410	Compilers
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
EECE 5606	Micro- and Nanofabrication
EECE 5642	Data Visualization
EECE 7200	Linear Systems Analysis
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7271	Computational Methods in Electromagnetics

EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
HLTH 5600	Introduction to Patient Safety
HLTH 5610	Patient Safety Science
HLTH 5630	Quality Improvement in Patient Safety
HLTH 5800	AI Across the Health Sciences
HSCI 5150	Methods for Observational Research 1
HSCI 5180	Phenotyping
HSCI 5190	Cohort Building
IE 7315	Human Factors Engineering
ME 5650	Advanced Mechanics of Materials
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method 1
ME 5658	Continuum Mechanics
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7238	Finite Element Method 2
ME 7275	Essentials of Fluid Dynamics
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
OR 6205	Deterministic Operations Research
PHSC 5100	Concepts in Pharmaceutical Science
PHSC 6290	Biophysical Methods in Drug Discovery
PHTH 5210	Biostatistics in Public Health
PHTH 5214	Environmental Health
PHTH 6440	Advanced Methods in Biostatistics
PHYS 5116	Network Science 1
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7321	Computational Physics
PHYS 7741	Physics of Biological Processes and Living Systems 2
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems
PT 5138 and PT 5139	Neuroscience and Lab for PT 5138
PT 5150 and PT 5151	Motor Control, Development, and Learning and Lab for PT 5150

Dissertation

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review

Qualifying examination (within two years of entry)

Dissertation committee

Area examination (dissertation prospectus/proposal)

Dissertation defense

Core Requirements

Code	Title	Hours
Seminar		
BIOE 7390	Seminar (Register and complete two semesters)	0
BIOE 7391	Student Seminar (Register and complete once in second year and once in fourth year)	0
Required Core		
BIOE 6200	Mathematical Methods in Bioengineering	4
BIOE 7000	Principles of Bioengineering	4
Approved Coursework		
Complete 8 semester hours from the electives listed below. (p. 484)		8

Electives Course List

Code	Title	Hours
Any course in the following list will serve as an elective course, provided the course is offered and the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the faculty advisor.		
BINF 6400	Genomics in Bioinformatics	
BIOE 5060	Special Topics in Bioengineering	
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5235	Biomedical Imaging	
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
BIOE 5410	Molecular Bioengineering	
BIOE 5411	Applied Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5450	Stem Cell Engineering	
BIOE 5510	Bioengineering Products/Technology Commercialization	
BIOE 5520	Bioengineering Design for Robotic Rehabilitation	
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	
BIOE 5648	Biomedical Optics	
BIOE 5650	Multiscale Biomechanics	
BIOE 5660	Integrative Mechanobiology	
BIOE 5710	Experimental Systems and Synthetic Bioengineering	
BIOE 5720	Physical Bioengineering	
BIOE 5750	Modeling and Inference in Bioengineering	
BIOE 5760	Method and Logic in Systems Biology and Bioengineering	
BIOE 5770	Machine Learning Methods in Biology and Health	
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
BIOE 5850	Design of Implants	
BIOE 5860	Engineering Approaches to Precision Medicine I	
BIOE 5870	Engineering Approaches to Precision Medicine II	

BIOE 5880	Computational Methods in Systems Bioengineering
BIOE 6100	Medical Physiology
BIOE 7210	A Data Science Toolkit for Human Neuroscience Research
BIOL 5543	Stem Cells and Regeneration
BIOL 5601	Multidisciplinary Approaches in Motor Control
BIOL 6300	Biochemistry
BIOL 6301	Molecular Cell Biology
CAEP 6202	Research, Evaluation, and Data Analysis
CHEM 5620	Protein Chemistry
CHEM 5621	Principles of Chemical Biology
CHEM 5638	Molecular Modeling
CHME 5630	Biochemical Engineering
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5310	Computer Graphics
CS 5330	Pattern Recognition and Computer Vision
CS 5335	Robotic Science and Systems
CS 5340	Computer/Human Interaction
CS 5400	Principles of Programming Language
CS 5600	Computer Systems
CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6410	Compilers
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
EECE 5606	Micro- and Nanofabrication
EECE 5642	Data Visualization
EECE 7200	Linear Systems Analysis
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7271	Computational Methods in Electromagnetics
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
HLTH 5600	Introduction to Patient Safety
HLTH 5610	Patient Safety Science
HLTH 5630	Quality Improvement in Patient Safety
HLTH 5800	AI Across the Health Sciences
HSCI 5150	Methods for Observational Research 1
HSCI 5180	Phenotyping
HSCI 5190	Cohort Building
IE 7315	Human Factors Engineering
ME 5650	Advanced Mechanics of Materials

ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method 1
ME 5658	Continuum Mechanics
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7238	Finite Element Method 2
ME 7275	Essentials of Fluid Dynamics
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
OR 6205	Deterministic Operations Research
PHSC 5100	Concepts in Pharmaceutical Science
PHSC 6290	Biophysical Methods in Drug Discovery
PHTH 5210	Biostatistics in Public Health
PHTH 5214	Environmental Health
PHTH 6440	Advanced Methods in Biostatistics
PHYS 5116	Network Science 1
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7321	Computational Physics
PHYS 7741	Physics of Biological Processes and Living Systems 2
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems
PT 5138 and PT 5139	Neuroscience and Lab for PT 5138
PT 5150 and PT 5151	Motor Control, Development, and Learning and Lab for PT 5150

Dissertation

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Interdisciplinary Engineering, PhD (Boston)

130 Snell Engineering Center

617.373.2711

The College of Engineering offers an interdisciplinary engineering Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. This is an individually designed program for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with their faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern University's established degree standards but need not agree exactly with the regulations of individual units. Individually designed interdisciplinary degree programs must be approved by the appropriate graduate office(s).

The interdisciplinary engineering program admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements as well as all the required coursework.

Program Requirements

In order to pursue an individually designed interdisciplinary engineering graduate program, a student must have been accepted into the interdisciplinary engineering program by an approved graduate program that will serve as the administrative home unit for the interdisciplinary engineering program:

- Department of Bioengineering (p. 470)
- Department of Chemical Engineering (p. 499)
- Department of Civil and Environmental Engineering (p. 514)
- Department of Electrical and Computer Engineering (p. 544)
- Department of Mechanical and Industrial Engineering (p. 612)

Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary engineering PhD program with the department from which they were dismissed as either home or participating department.

The interdisciplinary engineering PhD program requires a commitment from a Northeastern faculty member to serve as the student's primary faculty advisor and chair of their interdisciplinary engineering PhD committee. The primary faculty member is affiliated with the program's administrative home unit unless otherwise approved by the administrative home unit. The PhD advisory committee must be assembled within the first semester of the program, and at least two units must be represented on the committee. The committee must include at least one faculty co-advisor from all participating academic units and otherwise conforms to the rules of the home unit. This committee will be responsible for overseeing the completion of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

Supplementary Interdisciplinary Engineering PhD Program Forms

Successful application and admission to the interdisciplinary engineering PhD program requires a completed Program Preliminary Study Plan, available on the COE Graduate Student Services Forms website. This form provides a memorandum of understanding for your proposed PhD including the primary departments and advisor(s), a brief description of the planned research, and explanation of the rationale for an interdisciplinary PhD program.

No later than one year postentry into the program, a completed and signed Interdisciplinary Program Plan must be submitted to the Graduate School of Engineering. This individually designed plan includes a list of courses to be taken, a description of the qualifying and comprehensive examination process to be used, a timeline, and any other requirements of the program. This form can be found on the COE Graduate Student Services Forms website.

Qualifying Examination and Degree Candidacy

Interdisciplinary engineering PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the other department(s) involved with the student's program of study. To qualify as an interdisciplinary engineering doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required coursework.

Dissertation

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary engineering PhD students must follow the dissertation guidelines of their home department.

Residency Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. Successful completion of the total interdisciplinary engineering PhD program depends on meeting department academic milestones and academic expectations.

Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

Program Requirements

Direct Entry

Complete all requirements listed below unless otherwise indicated.

Milestones

Interdisciplinary Engineering PhD Program Preliminary Study Plan	Interdisciplinary Program Plan	Dissertation committee formation

Doctoral qualifying exams (both written comprehensive and oral area exams)
Annual review

Dissertation proposal
Dissertation defense

Requirements

Code	Title	Hours
A minimum of 48 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		48

Dissertation Course Requirements

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters according to their academic home unit:

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Advanced Entry Program Requirements

Advanced Entry

Complete all requirements listed below unless otherwise indicated.

Milestones

Interdisciplinary Engineering PhD Program Preliminary Study Plan Interdisciplinary Program Plan Dissertation committee formation Doctoral qualifying exams (both written comprehensive and oral area exams) Annual review Dissertation proposal Dissertation defense

Requirements

Code	Title	Hours
A minimum of 20 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		20

Dissertation Course Requirements

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters according to their academic home unit:

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	

or IE 9991
or ME 9991

Dissertation Term 2
Dissertation Term 2

Program Credit/GPA Requirements

20 total semester hours required
Minimum 3.000 GPA required

Robotics, MS (Boston)

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics offers instruction by the faculty of the College of Engineering, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences. The program is designed to provide students with comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Biomedical and Rehabilitation Robotics—College of Engineering
- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

Gordon Institute of Engineering Leadership

Master's Degree in Robotics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Robotics in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved robotics technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the certificate coursework may be applied to this program's elective requirements in the coursework option.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Electrical and Computer Engineering		
Complete one of the following:		4
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Computer Science		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

Concentrations

Complete one of the following options:

- Biomedical and Rehabilitation Robotics (p. 181)—College of Engineering
- Computer Science (p. 182)—Khoury College of Computer Sciences

- Electrical and Computer Engineering (p. 182)—College of Engineering
- Mechanical Engineering (p. 183)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required (33 total semester hours with participation in co-op in certain concentrations)

Minimum 3.000 GPA required

BIOMEDICAL AND REHABILITATION ROBOTICS CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
Complete one of the following:		4
BIOE 5520	Bioengineering Design for Robotic Rehabilitation	
PT 5170 and PT 5171	Motor Control and Lab for PT 5170	
PT 5321	Applications of Biomechanics in Human Function and Movement	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 183)		
<i>Project Option</i>		
Students working with Department of Physical Therapy, Movement, and Rehabilitation Sciences faculty should enroll in the PT course. Students working with Department of Bioengineering faculty should choose the BIOE course.		
BIOE 7945	Master's Project	
or PT 7995	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p. 183)		
<i>Thesis Option</i>		
Students working with Department of Physical Therapy, Movement, and Rehabilitation Sciences faculty should enroll in the PT course. Students working with Department of Bioengineering faculty should choose the BIOE course.		
BIOE 7945	Master's Project	
or PT 7995	Master's Project	
BIOE 7990	Thesis	
or PT 7990	Thesis	
Complete 8 semester hours of courses from the elective course list. (p. 183)		
Optional Co-op		
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.		
Required Course		
Complete one additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
Options		
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 183)		
<i>Project Option</i>		
CS 8674	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p. 183)		

Thesis Option

CS 7990	Thesis	
CS 8674	Master's Project	
Complete 8 semester hours of courses from the elective course list. (p. 183)		

Optional Co-op

For students in the this concentration, please consult your academic advisor for co-op procedures.

ELECTRICAL AND COMPUTER ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours

Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional EECE course not used to fulfill the core requirements: 4

EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	

Options

Complete one of the following options: 16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

EECE 7945	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p. 183)		

Thesis Option

EECE 7945	Master's Project	
EECE 7990	Thesis	

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

Complete the following (students must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

MECHANICAL ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours

Students in the mechanical engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional ME course not used to fulfill the core requirements: 4

ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	

Options

Complete one of the following options: 16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

ME 7945	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p. 183)		

Thesis Option

ME 7945	Master's Project	
ME 7990	Thesis	

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

Complete the following (students must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Elective Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)	
IE 6500	Human Performance	
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	
IE 7615	Neural Networks and Deep Learning	
ME 5240	Computer Aided Design and Manufacturing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5654	Elasticity and Plasticity	
ME 5655	Dynamics and Mechanical Vibration	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	

ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6250	Wearable Robotics
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7247	Advanced Control Engineering
PT 5170	Motor Control
PT 5321	Applications of Biomechanics in Human Function and Movement
PT 7001	Core Concepts in Rehabilitation Science and Research
PT 7005	Experimental Design and Applied Statistics
PT 7020	Technologies in Movement and Rehabilitation Science

Bioengineering, MSBioE (Boston)

Bioengineering is engineering in a biological context such as the human body, an ecosystem, or a bioreactor. In every case, the interface between engineered and biological systems places unique constraints on the design and implementation of devices, instruments, or implants. These depend on the properties of the biological system involved and the functionality that is being created.

The interface of engineering and medicine as embodied in bioengineering will be one of the most exciting endeavors and greatest adventures of the 21st century. Job opportunities are expected to expand dramatically with a focus on development of entirely new classes of products, instrumentation, and implants. The impact to human health will be extraordinary.

Bioengineering is intrinsically multidisciplinary and it is essential that students learn the languages used by multidisciplinary teams. To that end, our curriculum is structured around a core of six courses that analyze biological systems from every possible quantitative point of view. On the completion of the core, students select one of four concentrations, which provides the opportunity to develop a deep level of expertise in a specific area of bioengineering.

Bioengineering students will have unique opportunities in the classroom, research labs, and experiential learning. The projects that they may be able to contribute to include bio-bandages that monitor bacterial growth or that help damaged ligaments heal faster; sheets of cells folded like origami to form a working kidney; and new materials that—like a leaf in the sun—automatically sense and adapt to changes in the environment.

Our graduate program includes four concentrations, including:

- Biomechanics and Mechanobiology
- Biomedical Devices and Bioimaging
- Molecular, Cell, and Tissue Engineering
- Systems, Synthetic, and Computational Bioengineering

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Bioengineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Bioengineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 33-semester-hour degree and certificate will require 17 hours of advisor-approved bioengineering technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 16 semester hours of the certificate coursework may be applied to the requirements of the coursework option of any concentration of this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Note: This major requires a concentration: biomechanics and mechanobiology; biomedical devices and bioimaging; molecular, cell, and tissue engineering; or systems, synthetic, and computational bioengineering. Consult your college administrator.

Core Requirements

Code	Title	Hours
Seminar		
BIOE 7390	Seminar ¹	0

Required Core

A grade of C or higher is required in each course:

BIOE 6000	Principles of Bioengineering ¹	1
BIOE 6100	Medical Physiology	4

Concentrations

Complete one of the following four concentrations:

- Biomechanics and Mechanobiology (p. 494)
- Biomedical Devices and Bioimaging (p. 495)
- Molecular, Cell, and Tissue Engineering (p. 496)
- Systems, Synthetic, and Computational Bioengineering (p. 497)

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op; some concentrations may require additional hours)

Minimum 3.000 GPA required

¹ Principles of Bioengineering (BIOE 6000) and Seminar (BIOE 7390) are not required for students in a PlusOne bioengineering pathway, but students must successfully complete a total of 32 semester hours.

CONCENTRATION IN BIOMECHANICS AND MECHANOBIOLOGY

Code	Title	Hours
Required Coursework		
A grade of C or higher is required.		
Complete two of the following:		8
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	
BIOE 5650	Multiscale Biomechanics	
BIOE 5660	Integrative Mechanobiology	
ME 5665	Musculoskeletal Biomechanics	
Complete one of the following options:		20
<i>Coursework Option</i>		
Complete 20 semester hours from the course list. Any course on the required course list not used toward the core requirement may also be taken.		
<i>Project Option</i>		
BIOE 7945	Master's Project	
Complete 16 semester hours from the course list. Any course on the required course list not used toward the core requirement may also be taken.		
<i>Thesis Option</i>		
BIOE 7945	Master's Project	
BIOE 7990	Thesis	
Complete 12 semester hours from the course list. Any course on the required course list not used toward the core requirement may also be taken.		
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
Course List		

BIOE 5115	Dynamical Systems in Biological Engineering
BIOE 5440	The Cell as a Machine
BIOE 5520	Bioengineering Design for Robotic Rehabilitation
BIOE 5630	Physiological Fluid Mechanics
BIOE 5640	Computational Biomechanics
BIOE 5650	Multiscale Biomechanics
BIOE 5660	Integrative Mechanobiology
BIOE 5770	Machine Learning Methods in Biology and Health
BIOE 5820	Biomaterials
or CHME 5631	Biomaterials Principles and Applications
BIOL 5601	Multidisciplinary Approaches in Motor Control
CHME 5632	Advanced Topics in Biomaterials
EECE 7200	Linear Systems Analysis
EECE 7203	Complex Variable Theory and Differential Equations
ME 5650	Advanced Mechanics of Materials
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method 1
ME 5658	Continuum Mechanics
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 7238	Finite Element Method 2

CONCENTRATION IN BIOMEDICAL DEVICES AND BIOIMAGING

Code	Title	Hours

Required Coursework

A grade of C or higher is required:

BIOE 5800	Systems, Signals, and Controls for Bioengineers	4

Complete two of the following:		8

BIOE 5235	Biomedical Imaging	
or BIOE 5648	Biomedical Optics	
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
BIOE 5810	Design of Biomedical Instrumentation	

Complete one of the following options:		16

Coursework Option

Complete 16 semester hours from the course list. Any course on the required course list not used toward the core requirement may also be taken.

Project Option

BIOE 7945	Master's Project	

Complete 12 semester hours from the course list. Any course on the required course list not used toward the core requirement may also be taken.

Thesis Option

BIOE 7945	Master's Project	
BIOE 7990	Thesis	

Complete 8 semester hours from the course list. Any course on the required course list not used toward the core requirement may also be taken.

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Course List

BIOE 5115	Dynamical Systems in Biological Engineering
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design
BIOE 5510	Bioengineering Products/Technology Commercialization
BIOE 5520	Bioengineering Design for Robotic Rehabilitation
BIOE 5648	Biomedical Optics

or BIOE 5235	Biomedical Imaging
BIOE 5770	Machine Learning Methods in Biology and Health
BIOE 5810	Design of Biomedical Instrumentation
BIOE 5820	Biomaterials
or CHME 5631	Biomaterials Principles and Applications
BIOE 5850	Design of Implants
CHME 5632	Advanced Topics in Biomaterials
EECE 5606	Micro- and Nanofabrication
EECE 7200	Linear Systems Analysis
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7204	Applied Probability and Stochastic Processes
ME 5657	Finite Element Method 1
NNMD 5370	Nanomedicine Research Techniques

CONCENTRATION IN MOLECULAR, CELL, AND TISSUE ENGINEERING

Code	Title	Hours

Required Coursework

A grade of C or higher is required:

BIOE 5410	Molecular Bioengineering	4
or BIOE 5411	Applied Molecular Bioengineering	
BIOE 5420	Cellular Engineering	4

Complete one of the following options: 19-20

Coursework Option

Complete 19–20 semester hours from the course list. Any course on the required course list not used toward the core requirement may also be taken.

Project Option

BIOE 7945 Master's Project

Complete 15–16 semester hours from the course list. Any course on the required course list not used toward the core requirement may also be taken.

Thesis Option

BIOE 7945 Master's Project

BIOE 7990 Thesis

Complete 11–12 semester hours from the course list. Any course on the required course list not used toward the core requirement may also be taken.

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Course List

BIOE 5115	Dynamical Systems in Biological Engineering
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design
BIOE 5411	Applied Molecular Bioengineering
BIOE 5430	Principles and Applications of Tissue Engineering
BIOE 5440	The Cell as a Machine
BIOE 5450	Stem Cell Engineering
BIOE 5510	Bioengineering Products/Technology Commercialization
BIOE 5650	Multiscale Biomechanics
BIOE 5660	Integrative Mechanobiology
BIOE 5710	Experimental Systems and Synthetic Bioengineering
BIOE 5711	Advanced Experimental Systems and Synthetic Bioengineering
BIOE 5720	Physical Bioengineering
BIOE 5770	Machine Learning Methods in Biology and Health
BIOE 5820	Biomaterials
or CHME 5631	Biomaterials Principles and Applications
BIOL 5543	Stem Cells and Regeneration
BIOL 6301	Molecular Cell Biology

CHME 5160	Drug Delivery: Engineering Analysis
CHME 5515	Process Safety Engineering for Biotechnology and Pharmaceutical Industries
CHME 5632	Advanced Topics in Biomaterials
NNMD 5370	Nanomedicine Research Techniques
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market

CONCENTRATION IN SYSTEMS, SYNTHETIC, AND COMPUTATIONAL BIOENGINEERING

Code	Title	Hours
Required Coursework		
A grade of C or higher is required.		
Complete three of the following:		12
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5710	Experimental Systems and Synthetic Bioengineering	
BIOE 5720	Physical Bioengineering	
BIOE 5750	Modeling and Inference in Bioengineering	
Complete one of the following options:		15-16
<i>Coursework Option</i>		
Complete 15-16 semester hours from the course list. Any course on the required course list not used toward the core requirement may also be taken.		
<i>Project Option</i>		
BIOE 7945	Master's Project	
Complete 11-12 semester hours from the course list. Any course on the required course list not used toward the core requirement may also be taken.		
<i>Thesis Option</i>		
BIOE 7945	Master's Project	
BIOE 7990	Thesis	
Complete 7-8 semester hours from the course list. Any course on the required course list not used toward the core requirement may also be taken.		
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
Course List		
BINF 6400	Genomics in Bioinformatics	
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5510	Bioengineering Products/Technology Commercialization	
BIOE 5640	Computational Biomechanics	
BIOE 5711	Advanced Experimental Systems and Synthetic Bioengineering	
BIOE 5750	Modeling and Inference in Bioengineering	
BIOE 5760	Method and Logic in Systems Biology and Bioengineering	
BIOE 5770	Machine Learning Methods in Biology and Health	
BIOE 5860	Engineering Approaches to Precision Medicine I	
BIOE 5870	Engineering Approaches to Precision Medicine II	
BIOE 5880	Computational Methods in Systems Bioengineering	
BIOL 6299	Molecular Cell Biology for Biotechnology	
CHEM 5638	Molecular Modeling	
CHME 5630	Biochemical Engineering	
DS 5110	Essentials of Data Science	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
PHTH 5202	Introduction to Epidemiology	
PHYS 5116	Network Science I	

- ¹ Principles of Bioengineering (BIOE 6000) and Seminar (BIOE 7390) are not required for students in a PlusOne bioengineering pathway, but students must successfully complete a total of 32 semester hours.

Bioengineering, MSBioE—Connect (Boston)

The Master of Science in Bioengineering—Connect program, with a concentration in biomedical devices and bioimaging, addresses the demand for skilled individuals who can engage with bioengineering challenges and innovations by preparing students from nonengineering backgrounds to become bioengineers. Recognizing bioengineering's complexity and interdisciplinary nature, this Connect program focuses on learners developing the necessary foundational and applied knowledge in mathematics and programming to successfully transition to the bioengineering field. Through specially created and defined core courses, students gain the bioengineering knowledge to excel in their academic coursework and the bioengineering sector.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Connect Courses

Code	Title	Hours
Courses to be taken concurrently in the first semester. A grade of C or higher is required.		
BIOE 5150	Foundational Mathematics of Bioengineering	4
BIOE 5151	Computational Tools in Bioengineering	4

Core Requirements

Code	Title	Hours
Required Core		
A grade of C or higher is required.		
BIOE 6000	Principles of Bioengineering	1
BIOE 6100	Medical Physiology	4
Seminar		
BIOE 7390	Seminar	0

Concentration in Biomedical Devices and Bioimaging

Code	Title	Hours
Required Courses		
A grade of C or higher is required.		
BIOE 5800	Systems, Signals, and Controls for Bioengineers	4
Complete two of the following:		8
BIOE 5235	Biomedical Imaging	
or BIOE 5648	Biomedical Optics	
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
BIOE 5810	Design of Biomedical Instrumentation	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours of courses from the electives course list. (p. 499)		16

PROJECT OPTION

Code	Title	Hours
BIOE 7945	Master's Project	4
Complete 12 semester hours of courses from the electives course list. (p. 499)		12

THESIS OPTION

Code	Title	Hours
BIOE 7945	Master's Project	4
BIOE 7990	Thesis	4
Complete 8 semester hours of courses from the electives course list. (p. 499)		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Co-Op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

41 total semester hours required (42 with optional co-op)

Minimum 3.000 GPA required

ELECTIVES

Code	Title	Hours
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5510	Bioengineering Products/Technology Commercialization	
BIOE 5520	Bioengineering Design for Robotic Rehabilitation	
BIOE 5648	Biomedical Optics	
BIOE 5770	Machine Learning Methods in Biology and Health	
BIOE 5820	Biomaterials	
or CHME 5631	Biomaterials Principles and Applications	
BIOE 5850	Design of Implants	
CHME 5632	Advanced Topics in Biomaterials	
EECE 5606	Micro- and Nanofabrication	
EECE 7200	Linear Systems Analysis	
EECE 7203	Complex Variable Theory and Differential Equations	
EECE 7204	Applied Probability and Stochastic Processes	
ME 5657	Finite Element Method 1	
NNMD 5370	Nanomedicine Research Techniques	

Chemical Engineering

Website (<http://www.che.neu.edu>)

Rebecca Kuntz Willits, PhD

Professor and Chairperson

201 Cullinane

617.373.2989

617.373.2209 (fax)

Mission of the Department

The mission of the Department of Chemical Engineering at Northeastern University is to educate and train students in chemical engineering practice through integrating an inclusive classroom environment with hands-on and cooperative education experiences while solving research problems that impact our world.

The graduate programs in the Department of Chemical Engineering offer students the opportunity to work on challenges facing our society and our planet in areas such as biomedicine, energy, security, and sustainability. Students develop an in-depth understanding of the principles of chemical engineering through core coursework and applied electives, while gaining career experience through laboratories, research, or co-op. The overarching goal of the rich research and educational experience is to equip our students to become future leaders in engineering and science, while simultaneously promoting scholarly achievement for both the faculty and students.

Academic Programs

The department offers graduate programs in both chemical engineering and pharmaceutical engineering:

- MS in Chemical Engineering
 - MS in Chemical Engineering students can select a concentration that is focused either on sustainability, biosystems, or development of research skills.
- MS in Pharmaceutical Engineering
- PhD in Chemical Engineering
- PhD in Interdisciplinary Engineering

Many graduate-level courses are in the late afternoon or early evening to make them accessible to part-time students with full-time industrial careers. A full-time student may apply for participation in co-op. MS or PhD students pursuing research should first gain the consent of their advisor(s) prior to participating in the co-op plan. Any deviations from the curriculum must be addressed by petition to the graduate committee and will be considered on a case-by-case basis.

Graduate students pursuing a thesis MS or a PhD degree are able to select research topics from a diverse range of faculty interests. The department's research areas include biomolecular and biomedical systems, complex and computational systems, energy and sustainability, engineering education and pedagogy, and materials and nanotechnology. New graduate students can learn about ongoing research from individual faculty members, faculty websites, and graduate student seminars. Graduate student seminars are held on a regular basis and provide an interactive forum for learning and exchanging research ideas.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with their degree. Students should consult their faculty advisor regarding these options (p. 770).

GRADUATE CERTIFICATE IN PROCESS SAFETY ENGINEERING

The Process Safety Engineering Graduate Certificate program focuses on the integration of chemical engineering skills with the knowledge of process safety and regulation with specific attention on designing and developing solutions for industrial firms with the goal of creating environments that are safer and in compliance with regulatory rules and regulations.

GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 1349) in combination with the MS degree.

Programs

Doctor of Philosophy (PhD)

- Chemical Engineering (p. 500) (Boston)
- Interdisciplinary Engineering (p. 486) (Boston)

Master of Science (MS)

- Pharmaceutical Engineering (p. 507) (Boston)

Master of Science in Chemical Engineering (MScE)

- Chemical Engineering (p. 509) (Boston)

Graduate Certificate

- Process Safety Engineering (p. 514) (Boston)

Chemical Engineering, PhD (Boston)

Each student admitted to the PhD program in chemical engineering will initially be designated a doctoral student. Upon successful completion of the requirements for doctoral candidacy as described below, a student is reclassified as a doctoral candidate. After establishing candidacy, a student must complete a dissertation under the direction of a dissertation advisor. All doctoral candidates must also pass a final written and oral examination.

Doctoral Candidacy for Direct Entry

To qualify for doctoral candidacy, the student must demonstrate mastery of four core courses of chemical engineering (thermodynamics or statistical thermodynamics, kinetics, transport, and mathematics). To become a doctoral candidate, students must maintain a grade-point average of 3.250

or above in the four core courses and have no individual grade below a B– in the four core courses. Mastery of the four core courses must be demonstrated within the first year, unless an extension is granted by the department graduate committee.

In addition, each student must complete 4 semester hours of Research (CHME 9984) and demonstrate critical thinking, analysis, and experimental planning skills related to their dissertation research topic through a written candidacy proposal and an oral defense of this proposal. The student must pass, as determined by the student's dissertation committee, this candidacy proposal defense in order to advance to doctoral candidacy. If the student fails, they may resubmit their proposal and retake the defense one time within four months, unless an extension is granted by the primary research advisor and the department graduate committee. The student earns the classification of doctoral candidate upon successful completion of these requirements.

Doctoral Candidacy for Advanced Entry

To become a doctoral candidate, advanced-entry students who have already completed a graduate degree in chemical engineering or a closely related discipline must petition the graduate committee of the Department of Chemical Engineering and demonstrate that the mastery has been attained through coursework either at Northeastern University or during a previous graduate degree from another institution (typically granted when the student has achieved a grade of at least A– in an equivalent course; an official transcript and relevant course syllabus from the previous degree will be required for verification). The student must demonstrate mastery of the four core areas of chemical engineering (thermodynamics or statistical thermodynamics, kinetics, transport, and mathematics) through course performance.

The graduate committee may require a student to take or retake any or all of the core courses before achieving doctoral candidacy. Incoming advanced-entry students should form a plan of coursework in consultation with the associate chair for graduate studies and have this approved by the graduate committee. For the core courses taken at Northeastern, students should maintain a GPA of 3.250 or above and have no individual grade below a B–.

In addition, each student must complete 4 semester hours of Research (CHME 9984) and demonstrate critical thinking, analysis, and experimental planning skills related to their dissertation research topic through a written candidacy proposal and an oral defense of this proposal. The student must pass, as determined by the student's dissertation committee, this candidacy proposal defense in order to advance to doctoral candidacy. If the student fails, they may resubmit their proposal and retake the defense one time within four months, unless an extension is granted by the primary research advisor and the department graduate committee. The student earns the classification of doctoral candidate upon successful completion of these requirements.

Course Requirements

DIRECT ENTRY

A minimum of 32 semester hours of academic coursework, **not including any directed study credits**, beyond the bachelor's degree is required. The 32 semester hours must include at least 24 semester hours of academic coursework (exclusive of thesis or dissertation) taken at Northeastern. All four of the core courses (see table under Program Requirements), the 4 semester hours of research, and the 4 semester hours of professional development courses must be included in the student's academic graduate coursework.

ADVANCED ENTRY

A **minimum** of 20 semester hours of academic coursework, **not including any directed study credits**, beyond the master's degree is required. At least 16 semester hours of academic coursework (exclusive of thesis or dissertation) must be taken at Northeastern. At least one of the core courses (see table under Program Requirements), 4 semester hours of Research (CHME 9984), and 4 semester hours of professional development courses must be included in the student's academic graduate coursework. At least 8 semester hours of noncore electives must also be included. If the graduate committee requires additional core courses to achieve doctoral candidacy, these are in addition to the 20-semester-hour minimum.

GENERAL REQUIREMENTS

PhD students who have completed the majority of their coursework and not yet reached PhD candidacy should register for Research (CHME 9986), in a section for which their dissertation research advisor is listed as the instructor in the online registration system. The semester they plan to defend their proposal, they should register for Candidacy Preparation for Candidacy Preparation—Doctoral (CHME 8960) and for 4 semester hours of Research (CHME 9984).

After obtaining PhD candidacy, students are required to register for Dissertation Term 1 (CHME 9990) and Dissertation Term 2 (CHME 9991) for two consecutive semesters. This is then followed by registration for Dissertation Continuation (CHME 9996) in each semester thereafter until the dissertation has been completed and defended. Note: No course credits are awarded for Dissertation Term 1 (CHME 9990), Dissertation Term 2 (CHME 9991), or Dissertation Continuation (CHME 9996); however, a student is considered full time if registered for these courses.

All students pursuing a doctoral degree must enroll in the department's Seminar (CHME 7390) course for each semester they are working toward their degree.

Students will be advised on their courses for the first semester by the associate chair for graduate studies. After the first semester, students will work with their dissertation advisor to determine appropriate courses and course schedule to meet their educational needs and aspirations. Upon consultation with the dissertation advisor, a student may take up to 44 semester hours of course credit without additional financial penalty. Students and dissertation advisors should keep in mind that the university residency requirement requires two semesters of academic studies after becoming a doctoral candidate.

Language Requirement

There is no foreign language requirement for the PhD degree. However, each candidate must be proficient in technical writing and oral presentation in the English language. The graduate committee may require additional coursework to improve language proficiency, if necessary.

Residence Requirement

A student satisfies the residence requirement by completing one academic year of full-time graduate studies during two consecutive academic semesters after qualifying for doctoral candidacy. Additional required coursework (exclusive of seminars) may be completed during this period. Students are required to be continually enrolled while pursuing the completion of the dissertation.

Dissertation

After a student establishes doctoral candidacy, they must complete a dissertation that embodies the results of extended original research and includes material suitable for publication. The student is responsible for proposing a dissertation committee to be approved by the dissertation advisor at least one month prior to the dissertation defense. The committee must have a minimum of four members, including the primary advisor. At least two committee members must be faculty members in the Department of Chemical Engineering (with a greater than 0% appointment). Additionally, one of the committee members must be external to the Department of Chemical Engineering. Committee membership is not limited to faculty at Northeastern or to engineering faculty. The student is encouraged to consider experts in the dissertation topic and to work with the dissertation advisor to create a meaningful and helpful committee. The dissertation committee will approve the dissertation in its final form. The graduate school requirements for dissertation formatting and electronic submittal instructions can be found on the College of Engineering's webpage (<https://coe.northeastern.edu/academics-experiential-learning/graduate-school-of-engineering/graduate-student-services/dissertation-thesis-instructions/>). Students are responsible for contacting the Graduate School of Engineering for any updates to dissertation requirements and appropriate deadlines.

Dissertation Defense and Final Oral Examination

This comprehensive examination includes the public dissertation defense as well as a final oral examination to include the subject matter of the doctoral dissertation and significant developments in the field of the dissertation work. The oral presentation will be open to the public, including students, faculty, and the student's committee.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A minimum of 32 semester hours of academic coursework is required, plus 2 optional semester hours for cooperative education and mentoring in chemical engineering. Independent study credits do not count toward the 32 required semester hours.

Code	Title	Hours
Core Courses		
A cumulative 3.250 GPA, with no individual class lower than a B–, is required for the following:		
CHME 7320	Chemical Engineering Mathematics	4
or ME 6200	Mathematical Methods for Mechanical Engineers 1	
CHME 7330	Chemical Engineering Thermodynamics	4
CHME 7340	Chemical Engineering Kinetics	4
CHME 7350	Transport Phenomena	4
Research		
CHME 9984	Research	4
Professional Development		
CHME 7391	Professional Development and Communication in Chemical Engineering 1	1
CHME 7392	Professional Development and Communication in Chemical Engineering 2	1
CHME 7393	Professional Development and Communication in Chemical Engineering 3	1
CHME 7394	Professional Development and Communication in Chemical Engineering 4	1
Seminar		
Complete the following (repeatable) course each semester:		
CHME 7390	Seminar	

Recommended but optional:

CHME 7395	Mentoring in Chemical Engineering
ENCP 6100	Introduction to Cooperative Education

Electives

Code	Title	Hours
Complete 8 semester hours. Consult your faculty advisor for acceptable courses:		8
BIOE 5410	Molecular Bioengineering	
CHME 5101	Fundamentals of Chemical Engineering: Fluid, Heat, and Mass Transfer	
CHME 5105	Materials Characterization Techniques	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5179	Complex Fluids and Everyday Materials	
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5520	Designing for Process Safety	
CHME 5621	Electrochemical Engineering	
CHME 5630	Biochemical Engineering	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering	
CHME 7600	Pharmaceutical Engineering I	
CHME 7601	Pharmaceutical Engineering II	
CHME 7602	Pharmaceutical Engineering Laboratory	
CHME 7973	Special Topics in Chemical Engineering	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
ME 5620	Fundamentals of Advanced Materials	
NNMD 5270	Foundations in Nanomedicine: Therapeutics	
NNMD 5370	Nanomedicine Research Techniques	
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	

Dissertation

Code	Title	Hours
CHME 9990	Dissertation Term 1	
CHME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA overall required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A minimum of 20 semester hours (SH) of academic coursework is required, plus 2 optional semester hours for cooperative education and mentoring in chemical engineering. Independent study credits do not count toward the 20 required semester hours.

Code	Title	Hours
Core Courses		
Complete at least one of the four core classes. A cumulative 3.250 GPA—with no individual class below a B minus—is required for core classes taken: ¹		4
CHME 7320 or ME 6200	Chemical Engineering Mathematics Mathematical Methods for Mechanical Engineers 1	
CHME 7330	Chemical Engineering Thermodynamics	
CHME 7340	Chemical Engineering Kinetics	
CHME 7350	Transport Phenomena	
Research		
CHME 9984	Research	4
Seminar and Professional Development		
CHME 7391	Professional Development and Communication in Chemical Engineering 1	1
CHME 7392	Professional Development and Communication in Chemical Engineering 2	1
CHME 7393	Professional Development and Communication in Chemical Engineering 3	1
CHME 7394	Professional Development and Communication in Chemical Engineering 4	1
Complete the following repeatable course each semester:		
CHME 7390	Seminar	
Recommended but optional:		
ENCP 6100	Introduction to Cooperative Education	
CHME 7395	Mentoring in Chemical Engineering	
Electives		
Code	Title	Hours
Complete a minimum of 8 semester hours. Consult your faculty advisor for acceptable courses:		8
BIOE 5410	Molecular Bioengineering	
CHME 5101	Fundamentals of Chemical Engineering: Fluid, Heat, and Mass Transfer	
CHME 5105	Materials Characterization Techniques	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5179	Complex Fluids and Everyday Materials	
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5520	Designing for Process Safety	
CHME 5621	Electrochemical Engineering	
CHME 5630	Biochemical Engineering	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering	
CHME 7600	Pharmaceutical Engineering I	
CHME 7601	Pharmaceutical Engineering II	
CHME 7602	Pharmaceutical Engineering Laboratory	
CHME 7973	Special Topics in Chemical Engineering	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
ME 5620	Fundamentals of Advanced Materials	
NNMD 5270	Foundations in Nanomedicine: Therapeutics	
NNMD 5370	Nanomedicine Research Techniques	
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	

Dissertation

Code	Title	Hours
Complete the following two courses:		
CHME 9990	Dissertation Term 1	
CHME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

Minimum 20 total semester hours required

Minimum 3.000 GPA overall required

- ¹ Additional core classes may be required by the chemical engineering graduate committee to achieve PhD candidacy, which would not count toward the 20 SH minimum for the PhD.

Interdisciplinary Engineering, PhD (Boston)

130 Snell Engineering Center

617.373.2711

The College of Engineering offers an interdisciplinary engineering Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. This is an individually designed program for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with their faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern University's established degree standards but need not agree exactly with the regulations of individual units. Individually designed interdisciplinary degree programs must be approved by the appropriate graduate office(s).

The interdisciplinary engineering program admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements as well as all the required coursework.

Program Requirements

In order to pursue an individually designed interdisciplinary engineering graduate program, a student must have been accepted into the interdisciplinary engineering program by an approved graduate program that will serve as the administrative home unit for the interdisciplinary engineering program:

- Department of Bioengineering (p. 470)
- Department of Chemical Engineering (p. 499)
- Department of Civil and Environmental Engineering (p. 514)
- Department of Electrical and Computer Engineering (p. 544)
- Department of Mechanical and Industrial Engineering (p. 612)

Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary engineering PhD program with the department from which they were dismissed as either home or participating department.

The interdisciplinary engineering PhD program requires a commitment from a Northeastern faculty member to serve as the student's primary faculty advisor and chair of their interdisciplinary engineering PhD committee. The primary faculty member is affiliated with the program's administrative home unit unless otherwise approved by the administrative home unit. The PhD advisory committee must be assembled within the first semester of the program, and at least two units must be represented on the committee. The committee must include at least one faculty co-advisor from all participating academic units and otherwise conforms to the rules of the home unit. This committee will be responsible for overseeing the completion of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

Supplementary Interdisciplinary Engineering PhD Program Forms

Successful application and admission to the interdisciplinary engineering PhD program requires a completed Program Preliminary Study Plan, available on the COE Graduate Student Services Forms website. This form provides a memorandum of understanding for your proposed PhD including the primary departments and advisor(s), a brief description of the planned research, and explanation of the rationale for an interdisciplinary PhD program.

No later than one year postentry into the program, a completed and signed Interdisciplinary Program Plan must be submitted to the Graduate School of Engineering. This individually designed plan includes a list of courses to be taken, a description of the qualifying and comprehensive examination

process to be used, a timeline, and any other requirements of the program. This form can be found on the COE Graduate Student Services Forms website.

Qualifying Examination and Degree Candidacy

Interdisciplinary engineering PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the other department(s) involved with the student's program of study. To qualify as an interdisciplinary engineering doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required coursework.

Dissertation

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary engineering PhD students must follow the dissertation guidelines of their home department.

Residency Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. Successful completion of the total interdisciplinary engineering PhD program depends on meeting department academic milestones and academic expectations.

Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

Program Requirements

Direct Entry

Complete all requirements listed below unless otherwise indicated.

Milestones

Interdisciplinary Engineering PhD Program Preliminary Study Plan Interdisciplinary Program Plan Dissertation committee formation

Doctoral qualifying exams (both written comprehensive and oral area exams)

Annual review

Dissertation proposal

Dissertation defense

Requirements

Code	Title	Hours
A minimum of 48 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		48

Dissertation Course Requirements

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters according to their academic home unit:

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements

Advanced Entry

Complete all requirements listed below unless otherwise indicated.

Milestones

Interdisciplinary Engineering PhD Program Preliminary Study Plan Interdisciplinary Program Plan Dissertation committee formation Doctoral qualifying exams (both written comprehensive and oral area exams) Annual review Dissertation proposal Dissertation defense

Requirements

Code	Title	Hours
A minimum of 20 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		20

Dissertation Course Requirements

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters according to their academic home unit:

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

Pharmaceutical Engineering, MS (Boston)

The Master of Science in Pharmaceutical Engineering is offered jointly by Northeastern University's College of Engineering and Bouvé College of Health Sciences. The program prepares students with a fundamental understanding of pharmaceutical sciences and principles of engineering to develop the depth needed for advanced study of pharmaceutical engineering.

This program is generally pursued by students with a Bachelor of Science in Chemical Engineering or closely allied fields in engineering, sciences, or mathematics. The program was designed in collaboration with the Department of Pharmaceutical Sciences to develop the depth needed for advanced study of pharmaceutical engineering. Students wishing to pursue the master's degree with undergraduate educational backgrounds other than engineering are required to demonstrate completion of mathematics coursework through differential equations or the equivalent to be admitted. Prior completion of at least one semester of organic chemistry or the equivalent is also required, and some prior exposure to concepts in biochemistry and molecular biology is helpful. Students are advised to work closely with their advisors and instructors to determine the electives that would meet their career goals.

Part-Time Students

Part-time students may progress according to their plans and time constraints but within the seven-year time limit.

Master of Science students wishing to change their status from part time to full time must notify the chemical engineering department and make a formal petition to the Graduate School of Engineering. Refer to the regulations of the Graduate School of Engineering for further information on academic administrative policies.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CHME 6390	Professional Development and Communication Essentials (Complete this course twice.) ¹	0
CHME 7600	Pharmaceutical Engineering I	4
CHME 7601	Pharmaceutical Engineering II	4
CHME 7602	Pharmaceutical Engineering Laboratory	2
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 7010	Pharmaceutical Sciences Laboratory	4

¹ To be completed each of the first two semesters in the program.

Restricted Elective Courses

Code	Title	Hours

At least 4 semester hours of elective coursework is required from CHME, and at least 2 semester hours of elective coursework is required from PHSC and PMST. These semester hours could come from any elective group, as appropriate.

Regulatory

Complete 3–4 semester hours from the following: 3-4

BIOE 5250	Regulatory and Quality Aspects of Medical Device Design
BIOT 5340	Introduction to Biotherapeutic Approvals
BIOT 5500	Concepts in Regulatory Science
BIOT 6320	Design and Development of Biopharmaceuticals
RGA 6002	Introduction to Regulatory Compliance and Practice

Quality/Statistics

Complete 4 semester hours from the following: 4

CHME 5185	Design of Experiments and Ethical Research (DOEER)
CHME 6320	Numerical and Statistical Methods for Chemical Engineering
CHME 6410	Chemical Engineering Research Methods
IE 6200	Engineering Probability and Statistics
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
PHSC 6214	Experimental Design and Biostatistics

Depth Electives

Complete 6–7 semester hours from the following: 6-7

BIOE 5115	Dynamical Systems in Biological Engineering
BIOE 5411	Applied Molecular Bioengineering
BIOE 5510	Bioengineering Products/Technology Commercialization
BIOE 5860	Engineering Approaches to Precision Medicine I
BIOT 5330	Drug Safety and Immunogenicity
BIOT 6300	Pharmaceutical Microbiology
BIOT 6340	Sterile Manufacturing Operations
CHME 5160	Drug Delivery: Engineering Analysis
CHME 5179	Complex Fluids and Everyday Materials
CHME 5185	Design of Experiments and Ethical Research (DOEER)
CHME 5510	Fundamentals in Process Safety Engineering
CHME 5515	Process Safety Engineering for Biotechnology and Pharmaceutical Industries
CHME 5631 or BIOE 5820	Biomaterials Principles and Applications Biomaterials
CHME 5632	Advanced Topics in Biomaterials
CHME 5683	Introduction to Polymer Science
CHME 7330	Chemical Engineering Thermodynamics
CHME 7350	Transport Phenomena
PHSC 5300	Pharmaceutical Biochemistry

PHSC 5310	Cellular Physiology
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies
PHSC 5555	Pharmaceutical Toxicology
PHSC 5560	Nanotoxicity
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Chemical Engineering, MSChE (Boston)

For program contact information, please visit the College of Engineering website (<https://che.northeastern.edu/academics/graduate-studies/ms-che/>).

The Master of Science in Chemical Engineering is normally pursued by students with a Bachelor of Science in Chemical Engineering or closely allied fields. Students wishing to pursue the master's degree but with undergraduate educational backgrounds other than chemical engineering may be required to complete supplementary undergraduate coursework. These courses are in addition to the minimum course requirements. Students enrolled in the program are encouraged to seek guidance from their instructors and advisor regarding additional coursework that may supplement the graduate curriculum.

Students originally admitted to the master's degree program who wish to switch to the PhD program must petition the associate chair for graduate studies. If admission is granted, then the student must satisfy all the requirements of the doctoral degree program, including the requirements for doctoral candidacy.

Course Requirements

A minimum of 32 semester hours of academic work is required to qualify for the Master of Science degree in chemical engineering.

If pursuing the General Principles and Applications concentration, students can select from either the master's project option or master's thesis option. Students completing the master's project will take the 4-semester-hour master's project course and 4 semester hours of a core course. Students in the thesis track will complete the 4-semester-hour master's project course followed by the 4-semester-hour thesis course. In addition, each full-time student pursuing a thesis option must enroll in Professional Development and Communication Essentials (CHME 6390) in their first two semesters followed by Seminar (CHME 7390) for each semester they continue to work toward their degree. The faculty advisor and the student establish the sequence of courses that students take to pursue the Master of Science in Chemical Engineering.

If pursuing the Biosystems or Sustainability concentrations, students must complete a minimum of 32 semester hours of coursework. In addition, during their first two semesters of enrollment, they must complete Professional Development and Communication Essentials (CHME 6390).

Thesis Requirements

Students pursuing a Master of Science in Chemical Engineering with concentration in General Principles and Applications thesis option must submit to the Graduate School of Engineering a written thesis that is approved by the thesis committee and department chair. For details, see the graduate school requirements and electronic submittal instructions (<https://coe.northeastern.edu/academics-experiential-learning/graduate-school-of-engineering/graduate-student-services/dissertation-thesis-instructions/>). MS with thesis students must also complete an oral master's thesis defense in order to successfully complete the program. The student will be expected to form a master's thesis committee, composed of a minimum of three members—one who is the research advisor, one other faculty member from the chemical engineering department, and one member from outside the department. The oral presentation will be open to the public, including students, faculty, and the candidate's committee.

Part-time Students

Part-time students may progress according to their plans and time constraints but within the seven-year time limit. A minimum of 32 semester hours of academic coursework is required for part-time students.

Master of Science students wishing to change their status from part-time to full-time must notify the chemical engineering department and make a formal petition to the Graduate School of Engineering. Refer to the regulations of the Graduate School of Engineering for further information on academic administrative policies.

Departure Prior to Thesis Completion

Occasionally, students must leave the chemical engineering department prior to completion of all degree requirements. In such instances, long time intervals have often elapsed before thesis or manuscript submission. Accordingly, the department has adopted the guideline that a student cannot submit a thesis for credit beyond three years after the student stops actively pursuing the research. Exceptions may be granted upon petition to the departmental graduate committee. Petitions must demonstrate extenuating circumstances and prove that the research is still of value to the profession.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Chemical Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Chemical Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors, in addition to the semester hours required for the chemical engineering concentration selected. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the leadership challenge project coursework may be applied to this program's elective requirements with approval of the program director.

ENGINEERING BUSINESS

Master's Degree in Chemical Engineering with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Chemical Engineering in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. Students may use some of their breadth electives credits toward both the MS degree and the certificate. The certificate coursework, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business. (p. 685)

Program Requirements

All students must complete the following core requirements unless otherwise indicated. Courses cannot double count in two different categories.

Core Requirements

Code	Title	Hours
CHME 6310	Python for Chemical Engineers	2
CHME 6320	Numerical and Statistical Methods for Chemical Engineering	4
CHME 6390	Professional Development and Communication Essentials ¹	0

Concentrations

Complete one of the following concentrations:

- Biosystems (p. 510)
- General Principles and Applications (p. 511)
- Sustainability (p. 512)

BIOSYSTEMS CONCENTRATION

Code	Title	Hours
CHME 5160 or CHME 5630	Drug Delivery: Engineering Analysis Biochemical Engineering	4
CHME 6430	Chemical Engineering for Biosystems and Biomaterials	2

Biosystems Depth Electives

Complete 8 semester hours from the following (courses cannot count in multiple categories):		8
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
CHME 5515	Process Safety Engineering for Biotechnology and Pharmaceutical Industries	

CHME 5630	Biochemical Engineering
CHME 5631	Biomaterials Principles and Applications
CHME 5632	Advanced Topics in Biomaterials
CHME 5683	Introduction to Polymer Science
Biosystems Breadth Electives	
Complete 12 semester hours from the following (courses cannot count in multiple categories):	
BIOE 5410	Molecular Bioengineering
CHEM 5620	Protein Chemistry
CHEM 5625	Chemistry and Design of Protein Pharmaceuticals
CHEM 5638	Molecular Modeling
CHME 5105	Materials Characterization Techniques
CHME 5137	Computational Modeling in Chemical Engineering
CHME 5160	Drug Delivery: Engineering Analysis
CHME 5179	Complex Fluids and Everyday Materials
CHME 5185	Design of Experiments and Ethical Research (DOEER)
CHME 5510	Fundamentals in Process Safety Engineering
CHME 5515	Process Safety Engineering for Biotechnology and Pharmaceutical Industries
CHME 5621	Electrochemical Engineering
CHME 5630	Biochemical Engineering
CHME 5631	Biomaterials Principles and Applications
CHME 5632	Advanced Topics in Biomaterials
CHME 5642	Photochemistry Fundamentals and Applications
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences
CHME 5683	Introduction to Polymer Science
CHME 5699	Special Topics in Chemical Engineering
CHME 7330	Chemical Engineering Thermodynamics
CHME 7340	Chemical Engineering Kinetics
CHME 7350	Transport Phenomena
CHME 7600	Pharmaceutical Engineering I
CHME 7601	Pharmaceutical Engineering II
CHME 7973	Special Topics in Chemical Engineering
CIVE 7251	Environmental Biological Processes
EMGT 5220	Engineering Project Management
EMGT 6225	Economic Decision Making
EMGT 6305	Financial Management for Engineers
IE 6200	Engineering Probability and Statistics
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
ME 5620	Fundamentals of Advanced Materials
NNMD 5270	Foundations in Nanomedicine: Therapeutics
NNMD 5370	Nanomedicine Research Techniques
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
PHSC 6214	Experimental Design and Biostatistics

GENERAL PRINCIPLES AND APPLICATIONS CONCENTRATION

Code	Title	Hours
CHME 6410	Chemical Engineering Research Methods	2
CHME 7330	Chemical Engineering Thermodynamics	4
or CHME 7350	Transport Phenomena	
CHME 7390	Seminar ²	0

Thesis or Project Options

Complete one of the following options (courses cannot count in multiple categories): 8

Thesis Option

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest:

CHME 7945	Master's Project ³
CHME 7990	Thesis
<i>Project Option</i>	
CHME 7330	Chemical Engineering Thermodynamics
or CHME 7340	Chemical Engineering Kinetics
or CHME 7350	Transport Phenomena
CHME 7945	Master's Project

Electives Course List

Complete 12 semester hours from the following (courses cannot count in multiple categories): 12

BIOE 5410	Molecular Bioengineering
CHEM 5620	Protein Chemistry
CHEM 5625	Chemistry and Design of Protein Pharmaceuticals
CHEM 5638	Molecular Modeling
CHEM 5653 and CHEM 5651	Electrochemistry of Renewable Energy Devices and Materials Chemistry of Renewable Energy
CHME 5105	Materials Characterization Techniques
CHME 5137	Computational Modeling in Chemical Engineering
CHME 5160	Drug Delivery: Engineering Analysis
CHME 5179	Complex Fluids and Everyday Materials
CHME 5185	Design of Experiments and Ethical Research (DOEER)
CHME 5510	Fundamentals in Process Safety Engineering
CHME 5515	Process Safety Engineering for Biotechnology and Pharmaceutical Industries
CHME 5621	Electrochemical Engineering
CHME 5630	Biochemical Engineering
CHME 5631	Biomaterials Principles and Applications
CHME 5632	Advanced Topics in Biomaterials
CHME 5642	Photochemistry Fundamentals and Applications
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences
CHME 5683	Introduction to Polymer Science
CHME 7330	Chemical Engineering Thermodynamics
CHME 7340	Chemical Engineering Kinetics
CHME 7350	Transport Phenomena
CHME 7600	Pharmaceutical Engineering I
CHME 7601	Pharmaceutical Engineering II
CHME 7973	Special Topics in Chemical Engineering
EMGT 5220	Engineering Project Management
EMGT 6225	Economic Decision Making
EMGT 6305	Financial Management for Engineers
IE 6200	Engineering Probability and Statistics
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
ME 5620	Fundamentals of Advanced Materials
NNMD 5270	Foundations in Nanomedicine: Therapeutics
NNMD 5370	Nanomedicine Research Techniques
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
PHSC 6214	Experimental Design and Biostatistics

SUSTAINABILITY CONCENTRATION

Code	Title	Hours
CHME 5621	Electrochemical Engineering	4
or CHME 5683	Introduction to Polymer Science	
CHME 6420	Engineering for Chemical Sustainability	2

Sustainability Depth Electives

Complete two of the following (courses cannot count in multiple categories):		8
CHME 5105	Materials Characterization Techniques	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5179	Complex Fluids and Everyday Materials	
CHME 5621	Electrochemical Engineering	
CHME 5683	Introduction to Polymer Science	

Sustainability Breadth Electives

Complete 12 semester hours from the following (courses cannot count in multiple categories):		12
BIOE 5410	Molecular Bioengineering	
CHEM 5638	Molecular Modeling	
CHEM 5653 and CHEM 5651	Electrochemistry of Renewable Energy Devices and Materials Chemistry of Renewable Energy	
CHME 5105	Materials Characterization Techniques	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5179	Complex Fluids and Everyday Materials	
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5515	Process Safety Engineering for Biotechnology and Pharmaceutical Industries	
CHME 5621	Electrochemical Engineering	
CHME 5630	Biochemical Engineering	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5642	Photochemistry Fundamentals and Applications	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering	
CHME 7330	Chemical Engineering Thermodynamics	
CHME 7340	Chemical Engineering Kinetics	
CHME 7350	Transport Phenomena	
CHME 7600	Pharmaceutical Engineering I	
CHME 7601	Pharmaceutical Engineering II	
CHME 7973	Special Topics in Chemical Engineering	
CIVE 5250	Organic Pollutants in the Environment	
CIVE 5260	Environmental Fluid Mechanics	
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
CIVE 7251	Environmental Biological Processes	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
ME 5620	Fundamentals of Advanced Materials	

¹ To be completed in the first two semesters in the program.

² To be completed in same term with Master's Project (CHME 7945) and Thesis (CHME 7990).

³ To be completed prior to Thesis (CHME 7990).

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1

ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Process Safety Engineering, Graduate Certificate (Boston)

Through this graduate certificate program, students explore the identification and analysis of systems and processes relevant to their fields of study. Students have an opportunity to gain a fundamental understanding of considerations and methods for the safe design of engineered processes and to develop skills for creating computational models to represent and analyze hazardous scenarios.

This three-course graduate certificate seeks to provide students with skills to lead efforts within companies to plan and implement process safety designs that assist in meeting the regulatory requirements and confirming code compliance within an industrial firm in order to maintain the safety, health, and welfare of their employees and the public, as well as making industrial firms safer and profitable.

Program Requirements

Complete all requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Process Safety Core Courses		
CHME 5510	Fundamentals in Process Safety Engineering	4
or CHME 5515	Process Safety Engineering for Biotechnology and Pharmaceutical Industries	
CHME 5520	Designing for Process Safety	4
Process Engineering Electives		
Complete one of the following:		4
BIOE 5115	Dynamical Systems in Biological Engineering	
CHME 5630	Biochemical Engineering	
CHME 5692	Carbon Capture, Utilization, and Storage	
CHME 7600	Pharmaceutical Engineering I	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
CIVE 5368	Air Quality Management	
IE 5380	Integrated Automation	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 6300	Manufacturing Systems Design	
IE 7285	Statistical Quality Control	
ME 5659	Control Systems Engineering	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Civil and Environmental Engineering

Website (<https://cee.northeastern.edu/>)

R. Edward Beighley, PhD

COE Distinguished Professor and Chair

400 Snell Engineering Center

617.373.2444

Overview

With a strategic focus in urban engineering and through a range of teaching and research strengths, anchored by several multidisciplinary, multi-institutional centers and programs, our academic programs are designed to prepare professionals to address the global, complex, and ever-evolving engineering challenges of our time by building on current department strengths and expanding into vital areas. We give our future master's and PhD graduates the opportunity to make real-world impact on and long-lasting contributions to the well-being and development of society.

Mission of the Department

Advancing innovative civil and environmental solutions for society and creating globally oriented engineering leaders by integrating experiential education and use-inspired interdisciplinary research.

Academic Programs

Within our graduate programs, students work alongside world-class faculty on advanced research and courses, developing a solid base for their careers. Three overarching themes are emphasized in our programs: environmental health, civil infrastructure security, and sustainable resource engineering. These themes are aligned with the department's premier strengths in simulation (both computational and experimental), smart sensing, data and network science, and urban informatics and are all reflected in the courses offered in our graduate programs.

MASTER OF SCIENCE DEGREE

The department offers five MS degree programs in the following areas: civil engineering (students can choose one out of six concentrations); environmental engineering; engineering and public policy; sustainable building systems; and climate science and engineering (in partnership with the Department of Marine and Environmental Science in the College of Science). Options for a master's thesis or report in place of coursework are available. All civil and environmental engineering master's programs are available on a full-time or part-time basis. For a full list of the department's academic program offerings, please refer to the Programs (p. 515) tab.

DOCTOR OF PHILOSOPHY DEGREE

The department offers the following PhD degrees: PhD in Civil and Environmental Engineering and Interdisciplinary PhD. The doctoral program is designed to be flexible with respect to subject area and may be adapted to any subject area in civil and environmental engineering, including interdisciplinary options within the department or across departments or colleges.

The PhD is awarded to students who demonstrate high academic achievement and research competence in the selected field. Students must pursue the PhD program on a basis consistent with the residence requirements for the degree (p. 516).

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 738) in combination with the MS degree.

Programs

Doctor of Philosophy (PhD)

- Civil and Environmental Engineering (Boston) (p. 516)
- Interdisciplinary Engineering (Boston) (p. 486)

Master of Science (MS)

- Climate Science and Engineering (Boston)
- Engineering and Public Policy (Boston) (p. 523)
- Sustainability Engineering Leadership (Boston) (p. 525)

Master of Science in Civil Engineering (MSCivE)

- Civil Engineering with Concentration in Construction Management (Boston) (p. 526)
- Civil Engineering with Concentration in Data and Systems (Boston) (p. 528)
- Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering (Boston) (p. 531)
- Civil Engineering with Concentration in Structures (Boston) (p. 533)
- Civil Engineering with Concentration in Transportation (Boston) (p. 535)
- Civil Engineering with Concentration in Water, Environmental, and Coastal Systems (Boston) (p. 537)

Master of Science in Environmental Engineering (MSEnvE)

- Environmental Engineering (Boston) (p. 539)

Master of Science in Sustainable Building Systems (MSSBS)

- Sustainable Building Systems (Boston) (p. 541)

Graduate Certificate

- Climate and Engineering (Boston) (p. 543)
- Sustainability Engineering (Boston) (p. 544)

Civil and Environmental Engineering, PhD (Boston)

The Doctor of Philosophy in Civil and Environmental Engineering offers students an opportunity for in-depth study in a broad range of areas in civil and environmental engineering. Awarding the PhD degree is based on ability to formulate and execute original research addressing important problems and completion of a rigorous academic program that enhances the student's knowledge in relevant areas. The PhD program has two components:

1. An academic program of graduate-level courses that provides depth in a specific area of civil and environmental engineering (the major field) as well as other coursework that provides additional exposure at an advanced level to one or more disciplines
2. The dissertation, an extended independent research effort on a relevant technical problem resulting in an original contribution to the field

Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying examinations (both written and oral area exams) and all the required coursework.

Each student's mastery of subject matter is measured by a qualifying examination covering a subset of topics selected from the major field. A doctoral dissertation committee periodically monitors research progress, and the candidate is required to present and defend their research results before the doctoral dissertation committee upon completion of the work.

Coursework Requirement

The academic program must include at least 22 semester hours (advanced standing) or 50 semester hours (direct entry) of graduate-level coursework at Northeastern University. A student may count no more than 4 semester hours of independent study (such as special project in civil and environmental engineering) toward the minimum course requirements. For direct entry students, a minimum of 40 semester hours must be related to the major field but may include courses from other departments when appropriate. The civil and environmental engineering department encourages flexibility in program definition, especially in areas where complementary courses exist in other departments or where expertise resides outside the department and the objective is to introduce new technology in civil and environmental engineering practice.

PhD students who have completed the majority of their coursework and not yet reached PhD candidacy should register for Exam Preparation—Doctoral (CIVE 8960), in a section for which their research or academic advisor is listed as the instructor in the online registration system.

Upon successful completion of the qualifying exam and the majority of required coursework, each doctoral candidate must register in two consecutive semesters for Dissertation Term 1 (CIVE 9990) and Dissertation Term 2 (CIVE 9991). Upon completion of this sequence, the candidate must register for Dissertation Continuation (CIVE 9996) in every semester until the dissertation is complete. Students may not register for Continuation until they fulfill the two-semester dissertation sequence.

Qualifying Examination and Degree Candidacy

The objective of the doctoral qualifying examination is to determine whether the applicant possesses mastery of the fundamentals and ability to apply them to solve unfamiliar problems that require analysis, synthesis, and independent thinking, as well as communication skills to present research ideas and plans, motivate problems, respond to related questions, and defend assumptions and technical approach.

The qualifying exam includes written and oral components. Its content depends upon the educational background and objectives of the student. In general, the written component covers four subject areas selected from the major field and includes engineering and science disciplines, as well as civil and environmental engineering application areas. The oral component measures general comprehension and aptitude for research. If a student fails the exam, they may retake it one more time with the permission of the qualifying examination committee.

The qualifying exam is administered within the first 18 months of the PhD program, if the student already holds an MS degree. PhD students who begin the PhD program without an MS degree should take the qualifying exam within the first 30 months of the start of the program.

Under extraordinary circumstances, a student may be granted one additional semester before taking the qualifying exam but only by prior petition to the advisor, concentration representative, and graduate studies committee.

DISSERTATION

Once degree candidacy is established, a doctoral candidate may proceed with their dissertation. The candidate must write a dissertation proposal and name a CEE faculty member as the dissertation advisor. The candidate and the advisor must form a dissertation committee, which should have no fewer than four members, of which at least two are full-time (or affiliated) faculty from the CEE department. The committee will monitor progress and approve the final document.

DISSERTATION PROPOSAL PRESENTATION

Each student, along with a faculty advisor, must jointly develop a proposal defining the content of the academic program, subject to review by the dissertation committee. Intellectual rigor, connectivity of subject matter, and compatibility with departmental interests are critical issues. The doctoral dissertation committee's approval of the proposal represents a mutual agreement between the student and the committee.

Comprehensive Examination

The comprehensive exam is a defense of the doctoral research work and an examination on subject matter related to the dissertation area.

Each doctoral candidate must defend their dissertation within seven years from the start of the PhD program.

Annual Report

At the beginning of each calendar year all CEE doctoral students, including interdisciplinary students within CEE, should complete the Annual PhD Student Progress Report, which details academic and research activities and accomplishments over the previous year. These forms will be reviewed by the faculty in each respective concentration to ensure satisfactory progress, with feedback provided to the students as necessary.

Residence Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residence. The total effort for a PhD program involves a minimum of three years of full-time work beyond the bachelor's degree. Students who enter the doctoral program with a Master of Science degree may complete the requirements in less time but should anticipate at least two years of full-time effort.

Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination and comprehensive examination
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirements

Complete at least 50 semester hours of approved coursework. Consult your faculty advisor for acceptable courses. Please note that a maximum of 4 semester hours of Directed Study (CIVE 7976) will be accepted toward the 50-semester-hour requirement.

Code	Title	Hours
CIVE 7001	Research Methods For Civil and Environmental Engineering	2

Dissertation

Code	Title	Hours
CIVE 9990	Dissertation Term 1	
CIVE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

50 total semester hours required
Minimum 3.000 GPA required

Advanced Entry Program Requirements

Coursework Requirement

The Department of Civil and Environmental Engineering encourages flexibility in program definition, especially in areas where complementary courses exist in other departments or where expertise resides outside the department and the objective is to introduce new technology in civil and environmental engineering practice. The academic program must include at least 22 semester hours of graduate-level coursework at Northeastern University. A student may count no more than 4 semester hours of directed study toward the minimum course requirements.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination and comprehensive examination
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirements

Complete 22 semester hours of approved coursework. Consult your faculty advisor for acceptable courses. Please note that a maximum of 4 semester hours of Directed Study (CIVE 7976) will be accepted toward the 22-semester-hour requirement.

Code	Title	Hours
CIVE 7001	Research Methods For Civil and Environmental Engineering	2

Dissertation

Code	Title	Hours
CIVE 9990	Dissertation Term 1	
CIVE 9991	Dissertation Term 2	

Coursework Requirement

The academic program must include at least 22 semester hours of graduate-level coursework at Northeastern University.

A student may count no more than 4 semester hours of directed study toward the minimum course requirements.

Program Credit/GPA Requirements

22 total semester hours required

Minimum 3.000 GPA required

Interdisciplinary Engineering, PhD (Boston)

130 Snell Engineering Center
617.373.2711

The College of Engineering offers an interdisciplinary engineering Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. This is an individually designed program for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with their faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern University's established degree standards but need not agree exactly with the regulations of individual units. Individually designed interdisciplinary degree programs must be approved by the appropriate graduate office(s).

The interdisciplinary engineering program admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements as well as all the required coursework.

Program Requirements

In order to pursue an individually designed interdisciplinary engineering graduate program, a student must have been accepted into the interdisciplinary engineering program by an approved graduate program that will serve as the administrative home unit for the interdisciplinary engineering program:

- Department of Bioengineering (p. 470)
- Department of Chemical Engineering (p. 499)
- Department of Civil and Environmental Engineering (p. 514)
- Department of Electrical and Computer Engineering (p. 544)
- Department of Mechanical and Industrial Engineering (p. 612)

Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary engineering PhD program with the department from which they were dismissed as either home or participating department.

The interdisciplinary engineering PhD program requires a commitment from a Northeastern faculty member to serve as the student's primary faculty advisor and chair of their interdisciplinary engineering PhD committee. The primary faculty member is affiliated with the program's administrative home unit unless otherwise approved by the administrative home unit. The PhD advisory committee must be assembled within the first semester of the program, and at least two units must be represented on the committee. The committee must include at least one faculty co-advisor from all participating academic units and otherwise conforms to the rules of the home unit. This committee will be responsible for overseeing the completion of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

Supplementary Interdisciplinary Engineering PhD Program Forms

Successful application and admission to the interdisciplinary engineering PhD program requires a completed Program Preliminary Study Plan, available on the COE Graduate Student Services Forms website. This form provides a memorandum of understanding for your proposed PhD including

the primary departments and advisor(s), a brief description of the planned research, and explanation of the rationale for an interdisciplinary PhD program.

No later than one year postentry into the program, a completed and signed Interdisciplinary Program Plan must be submitted to the Graduate School of Engineering. This individually designed plan includes a list of courses to be taken, a description of the qualifying and comprehensive examination process to be used, a timeline, and any other requirements of the program. This form can be found on the COE Graduate Student Services Forms website.

Qualifying Examination and Degree Candidacy

Interdisciplinary engineering PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the other department(s) involved with the student's program of study. To qualify as an interdisciplinary engineering doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required coursework.

Dissertation

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary engineering PhD students must follow the dissertation guidelines of their home department.

Residency Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. Successful completion of the total interdisciplinary engineering PhD program depends on meeting department academic milestones and academic expectations.

Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

Program Requirements

Direct Entry

Complete all requirements listed below unless otherwise indicated.

Milestones

Interdisciplinary Engineering PhD Program Preliminary Study Plan Interdisciplinary Program Plan Dissertation committee formation

Doctoral qualifying exams (both written comprehensive and oral area exams)

Annual review

Dissertation proposal

Dissertation defense

Requirements

Code	Title	Hours
A minimum of 48 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		48

Dissertation Course Requirements

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters according to their academic home unit:

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	

or IE 9991	Dissertation Term 2
or ME 9991	Dissertation Term 2

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Advanced Entry Program Requirements

Advanced Entry

Complete all requirements listed below unless otherwise indicated.

Milestones

Interdisciplinary Engineering PhD Program Preliminary Study Plan Interdisciplinary Program Plan Dissertation committee formation Doctoral qualifying exams (both written comprehensive and oral area exams) Annual review Dissertation proposal Dissertation defense

Requirements

Code	Title	Hours
A minimum of 20 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		20

Dissertation Course Requirements

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters according to their academic home unit:

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

20 total semester hours required
Minimum 3.000 GPA required

Climate Science and Engineering, MS (Boston)

Overview

The Master of Science in Climate Science and Engineering is offered jointly by the College of Engineering and the College of Science. The program provides training in the fundamental scientific processes that underpin the structure and dynamics of the climate, as well as the engineering strategies and technologies required for decarbonization and adaptation to climate change.

Incoming students will typically hold a bachelor’s degree in a science, engineering, or related field. The program is designed to prepare students for climate-facing positions in the public or private sectors and can serve as a springboard for students interested in pursuing doctoral-level research. Students must take at least 12 semester hours of College of Science courses and at least 12 semester hours of College of Engineering courses, which includes a report, thesis, or coursework option.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Student should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Climate Science and Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Climate Science and Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership (p. 738), 12 semester hours of the certificate coursework may be applied to the restricted elective requirements of this program's coursework option. Of the remaining 20 semester hours required by this program, students must take 12 semester hours of College of Science courses (subject codes EEMB and ENVR) and 8 semester hours from College of Engineering courses (subject codes CIVE, EECE, ENSY, MATL, ME, and SBSY).

The Department of Civil and Environmental Engineering encourages students pursuing the Graduate Certificate in Engineering Leadership (p. 738) to complete their MS coursework requirements in their first year and their certificate requirements in their second year. Students who prefer to complete their certificate requirements in their first year are asked to speak with their MS degree advisor in advance.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. In order to ensure a balance of training across science and engineering, students must take at least 12 semester hours of College of Science courses (starting with EEMB, ENVR) and at least 12 semester hours of College of Engineering courses (starting with CIVE, EECE, ENSY, MATL, ME, SBSY) from the core requirements and restricted elective course options.

Core Requirements

Code	Title	Hours
Complete 20 semester hours from the core requirements listed below (any core course not used to meet this core course requirement can be taken as a restricted elective):		20
CIVE 5150 or ENVR 5150	Climate and Atmospheric Change Climate and Atmospheric Change	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
CIVE 5366	Air Quality Engineering and Science	
CIVE 5670 or ENVR 5670	Global Biogeochemistry Global Biogeochemistry	
CIVE 7110	Critical Infrastructure Resilience	
ENVR 5350	Sustainable Energy and Climate Solutions	
ENVR 5600	Coastal Processes, Adaptation, and Resilience	
ENVR 5800	Climate Adaptation and Nature-Based Solutions	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the restricted electives course list below. (p. 522)		12

REPORT OPTION

Code	Title	Hours
CIVE 7945 or EEMB 8984	Master's Project Research	4
Complete 8 semester hours from the restricted electives course list below. (p. 522)		8

THESIS OPTION

Code	Title	Hours
Complete CIVE 7945 and CIVE 7990 for 8 semester hours or complete EEMB 8984 twice for 8 semester hours:		8
CIVE 7945 and CIVE 7990	Master's Project and Thesis	
EEMB 8984	Research (Completed twice)	
Complete 4 semester hours from the restricted electives course list below. (p. 522)		4

In addition to completing the thesis course, College of Engineering students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Restricted Electives

Code	Title	Hours
CIVE 5280	Remote Sensing of the Environment	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7282	Coastal and Hydraulic Modeling	
CIVE 7385	Public Transportation	
CIVE 7392	Special Topics in Environmental Engineering	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ENVR 5210	Environmental Planning	
ENVR 5220	Ecosystem-Based Management	
ENVR 5563	Advanced Spatial Analysis	
INTL 5100	Climate and Development	
LAW 7634	Energy Law and Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5685	Solar Thermal Engineering	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
SBSY 5100	Sustainable Design and Technologies in Construction	
SBSY 5200	Sustainable Engineering Systems for Buildings	

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Engineering and Public Policy, MS (Boston)

For program contact information, please visit the College of Engineering website (<https://cee.northeastern.edu/academics/graduate-studies/ms-cepp/>).

The purpose of this degree is to provide students with a background in engineering with the tools necessary to conduct robust policy analysis. It includes required core courses from the Department of Civil and Environmental Engineering and the School of Public Policy and Urban Affairs, complemented by electives in engineering and public policy, which can be met by two courses and a master's report (recommended), or by one course and a thesis, or by three courses. A minimum of 16 semester hours must be taken in the College of Engineering.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Engineering and Public Policy with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Engineering and Public Policy in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Sustainable Engineering and Systems Modeling Requirements

Code	Title	Hours
Complete 12 semester hours from the following:		12
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
or PPUA 5261	Dynamic Modeling for Environmental Decision Making	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5368	Air Quality Management	
CIVE 6566	Sustainable Urban Transportation: Netherlands	
CIVE 6777	Climate Hazards and Resilient Cities Abroad	
CIVE 6778	Climate Adaptation and Policy Abroad	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7110	Critical Infrastructure Resilience	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
CIVE 7155	Dynamics and Control of Infrastructure Systems	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
IE 5500	Systems Engineering in Public Programs	
IE 5640	Data Mining for Engineering Applications	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
SBSY 5100	Sustainable Design and Technologies in Construction	
SBSY 5200	Sustainable Engineering Systems for Buildings	
SBSY 5400	Sustainable Building Systems Seminar	

Public Policy and Analysis Requirements

Code	Title	Hours
Complete 8 semester hours from the following:		8
INSH 5301	Introduction to Computational Statistics	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
INSH 7400	Quantitative Analysis	
LPSC 7311	Strategizing Public Policy	
PPUA 5246	Participatory Modeling for Collaborative Decision Making	
PPUA 5260	Ecological Economics	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6532	Building Resilience into Local Government	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Elective Course List below. (p. 524)		12

PROJECT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
Complete 8 semester hours from the Elective Course List below. (p. 524)		8

THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
Complete 4 semester hours from the Elective Course List below. (p. 524)		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

ELECTIVE COURSE LIST

Code	Title	Hours
CIVE 5150	Climate and Atmospheric Change	
CIVE 5250	Organic Pollutants in the Environment	

CIVE 5271	Solid and Hazardous Waste Management
CIVE 5280	Remote Sensing of the Environment
CIVE 5281	Coastal Dynamics and Design
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300
CIVE 5670	Global Biogeochemistry
CIVE 7230	Legal Aspects of Civil Engineering
CIVE 7392	Special Topics in Environmental Engineering (Equity in Civil and Environmental Engineering)
EMGT 6225	Economic Decision Making
ENVR 5210	Environmental Planning
ENVR 5260	Geographical Information Systems
ENVR 6102	Environmental Science and Policy Seminar 2
INSH 7400	Quantitative Analysis
INTL 5100	Climate and Development
LPSC 7311	Strategizing Public Policy
LPSC 7312	Cities, Sustainability, and Climate Change
PHTH 5214	Environmental Health
PHTH 5230	Global Health
PPUA 5249	Sustainable Urban Coastal Policy
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change
PPUA 5268	International Environmental Policy
PPUA 5270	Food Systems and Public Policy
PPUA 6101	Environmental Science and Policy Seminar 1
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context
PPUA 7346	Resilient Cities

Sustainability Engineering Leadership, MS (Boston)

The Master of Science in Sustainability Engineering Leadership is designed to train future leaders in the design and engineering of products, processes, and systems that address pressing environmental challenges. Students build core skills in engineering management and leadership while pursuing advanced training in one of two sustainable engineering tracks: sustainability assessment or energy and climate technologies. All students complete a comprehensive capstone project as part of the degree. The Master of Science in Sustainability Engineering Leadership is a double-degree program with University College Dublin. As a double-degree program, students complete their first year at Northeastern University—with 20 total semester hours and a potential four-month co-op or research experience—and take their remaining credits in the second year with University College Dublin.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
EMGT 5220	Engineering Project Management ¹	4
ENLR 5121	Engineering Leadership 1	2
ENLR 5122	Engineering Leadership 2	2

Master's Thesis or Challenge Projects

Code	Title	Hours
Complete one of the following sequences: ²		8
CIVE 7945 and CIVE 7990	Master's Project and Thesis	
ENLR 7440 and ENLR 7442	Engineering Leadership Challenge Project 1 and Engineering Leadership Challenge Project 2	

Concentrations

Complete one of the following options:

- Energy and Climate Technologies (p. 526)
- Sustainability Assessment (p. 526)

ENERGY AND CLIMATE TECHNOLOGIES CONCENTRATION

Code	Title	Hours
Complete 20 semester hours from the following: ³		20
CHME 6410	Chemical Engineering Research Methods	
CHME 6420	Engineering for Chemical Sustainability	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ENSY 5650	Geologic Energy Systems for Energy Generation and Carbon Sequestration	
ENSY 5700	Renewable Energy Development	
ENVR 5350	Sustainable Energy and Climate Solutions	
ENVR 5800	Climate Adaptation and Nature-Based Solutions	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5685	Solar Thermal Engineering	

SUSTAINABILITY ASSESSMENT CONCENTRATION

Code	Title	Hours
Complete 20 semester hours from the following: ⁴		20
CIVE 5255	Tools and Techniques of Environmental Health	
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5699	Special Topics in Civil Engineering (Equity in Civil and Environmental Engineering)	
CIVE 7110	Critical Infrastructure Resilience	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
SBSY 5100	Sustainable Design and Technologies in Construction	

¹ The following UCD course will also fulfill this requirement: MEEN40800.

² The following UCD courses must be used to fulfill this requirement: BSEN40550 and BSEN40570.

³ The following UCD courses will also fulfill this requirement: BSEN30310, BSEN30560, BSEN40320, BSEN40350, BSEN40560, and BSEN40700.

⁴ The following UCD courses will also fulfill this requirement: BSEN30060, BSEN30360, BSEN40400, BSEN40750, and BSEN40810.

Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

Civil Engineering with Concentration in Construction Management, MSCivE (Boston)

This program is intended for students interested in construction management and engineering or a closely related field. It includes required core courses primarily from the Department of Civil and Environmental Engineering (<https://cee.northeastern.edu/academics/graduate-studies/ms-cive/>), complemented by electives in civil and environmental engineering and other departments such as mechanical and industrial engineering and business administration. Based on proven proficiency in given areas, students may waive certain core courses and replace them with alternate elective courses.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	10 SH	10 SH	10 SH
Elective courses	18 SH	14 SH	22 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Civil Engineering with Concentration in Construction Management with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Construction Management in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 34-semester-hour degree and certificate will require fulfillment of the 10-semester-hour construction management core. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 14 semester hours of the certificate coursework may be applied to the elective requirements of this program's coursework option.

The Department of Civil and Environmental Engineering encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand.

ENGINEERING BUSINESS

Master's Degree in Civil Engineering with Concentration in Construction Management with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Civil Engineering with Concentration in Construction Management in addition to earning a Graduate Certificate in Engineering Business (p. 685). Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 10 semester hours of the core courses and 16 semester hours from the outlined business-skill curriculum. The coursework, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CIVE 5221	Construction Project Control and Organization	2
CIVE 7220	Construction Management	4
CIVE 7230	Legal Aspects of Civil Engineering	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 22 semester hours from the course list below. (p. 528)		22

PROJECT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
Complete 18 semester hours from the course list below. (p. 528)		18

THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
Complete 14 semester hours from the course list below. (p. 528)		14

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Course List

Code	Title	Hours
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
ACCT 6201	Financial Reporting and Managerial Decision Making 2	
CIVE 5231	Alternative Project Delivery Systems in Construction	
CIVE 7151	Urban Informatics and Processing	
CIVE 7240	Construction Equipment and Modeling	
CIVE 7301	Advanced Soil Mechanics	
CIVE 7302	Advanced Foundation Engineering	
DAMG 6210	Data Management and Database Design	
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6305	Financial Management for Engineers	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
IE 5617	Lean Concepts and Applications	
IE 5640	Data Mining for Engineering Applications	
or IE 7275	Data Mining in Engineering	
IE 6200	Engineering Probability and Statistics	
IE 7215	Simulation Analysis	
IE 7290	Reliability Analysis and Risk Assessment	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
OR 6205	Deterministic Operations Research	
SBSY 5200	Sustainable Engineering Systems for Buildings	
SBSY 5250	Building Performance Simulation	
SBSY 5300	Information Systems for Integrated Project Delivery	

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Civil Engineering with Concentration in Data and Systems, MSCivE (Boston)

This program is designed for students with career goals that require application of data and systems analysis to challenges across any discipline of civil and environmental engineering. The degree requirements include core courses (total of 20 semester hours) in data analysis and computing, systems and sensors, and data and systems topics in civil and environmental engineering, complemented by electives across multiple departments including mathematics, computer science, engineering, economics, and policy.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Electives	8 SH	4 SH	12 SH

Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Civil Engineering with Concentration in Data and Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Data and Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved data and systems engineering technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 12 semester hours of the certificate coursework may be applied to the elective requirements of this program's coursework option.

The Department of Civil and Environmental Engineering encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. At least 20 semester hours (of the 32 semester hours) must be listed as CIVE or SBSY and must form a cohesive advisor-approved program.

Core Requirements

Code	Title	Hours
Complete 20 semester hours from the following course lists:		20
Data and Computing		
Complete at least 4 semester hours from the following:		4
CIVE 5280	Remote Sensing of the Environment	
CIVE 7100	Time Series and Geospatial Data Sciences	
or ENVR 6500	Biostatistics	
or IE 6200	Engineering Probability and Statistics	
or IE 7280	Statistical Methods in Engineering	
or INSH 5301	Introduction to Computational Statistics	
or MATH 7343	Applied Statistics	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
or PPUA 5262	Big Data for Cities	
DAMG 6105	Data Science Engineering with Python	
DAMG 6210	Data Management and Database Design	
ENVR 5260	Geographical Information Systems	
IE 5640	Data Mining for Engineering Applications	
or IE 7275	Data Mining in Engineering	
Systems and Sensors		
Complete at least 4 semester hours from the following:		4
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5524	Vibration-Based Structural Health Monitoring	
CIVE 7155	Dynamics and Control of Infrastructure Systems	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
IE 5500	Systems Engineering in Public Programs	
OR 6205	Deterministic Operations Research	
OR 7230	Probabilistic Operation Research	
OR 7245	Network Analysis and Advanced Optimization	
PHYS 5116	Network Science I	
PPUA 6502	Economic Analysis for Policy and Planning	

PPUA 7237

Advanced Spatial Analysis of Urban Systems

Civil and Environmental Systems

Complete at least 8 semester hours from the following:

8

CIVE 5281	Coastal Dynamics and Design
CIVE 5363	Climate Science, Engineering Adaptation, and Policy
CIVE 5373	Transportation Systems: Analysis and Planning
CIVE 5522	Structural Systems Modeling
or CIVE 7330	Advanced Structural Analysis
CIVE 5536	Hydrologic and Hydraulic Design
CIVE 7110	Critical Infrastructure Resilience
CIVE 7341	Structural Reliability
CIVE 7342	System Identification
CIVE 7380	Performance Models and Simulation of Transportation Networks
CIVE 7381	Transportation Demand Forecasting and Model Estimation
CIVE 7385	Public Transportation
IE 7200	Supply Chain Engineering
OR 7310	Logistics, Warehousing, and Scheduling
SBSY 5100	Sustainable Design and Technologies in Construction
SBSY 5200	Sustainable Engineering Systems for Buildings
SBSY 5250	Building Performance Simulation

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete the remaining semester hours from the electives list below. (p. 530)		12

REPORT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
Complete the remaining semester hours from the electives list below. (p. 530)		8

THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
Complete the remaining semester hours from the electives list below. (p. 530)		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Electives List

Code	Title	Hours
Any core course not used to meet the core course requirements can be used as an elective.		
CIVE 5368	Air Quality Management	
CIVE 6566	Sustainable Urban Transportation: Netherlands	
CIVE 7220	Construction Management	
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7255	Environmental Physical/Chemical Processes	
CIVE 7260	Hydrologic Modeling	
CIVE 7382	Advanced Traffic Control and Simulation	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7204	Applied Probability and Stochastic Processes	
IE 5617	Lean Concepts and Applications	

IE 7215	Simulation Analysis
SBSY 5300	Information Systems for Integrated Project Delivery

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering, MSCivE (Boston)

This program includes study in the areas of soil mechanics/foundations and geoenvironmental engineering. It includes studies of soil and related earth materials for problems related to the protection of human health and the environment. Related areas include soil mechanics, fate/transport in subsurfaces, subsurface remediation, and others. The degree requirements include core courses from the Department of Civil and Environmental Engineering (<https://cee.northeastern.edu/academics/graduate-studies/ms-cive/>), complemented by electives in civil and environmental engineering, as well as electives from other departments such as mechanical and industrial engineering.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	8 SH	8 SH	8 SH
Elective courses	20 SH	16 SH	24 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require fulfillment of the 8-semester-hour core curriculum and 12 semester hours of restricted electives from the geotechnical/geoenvironmental engineering concentration coursework. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 12 semester hours of the certificate coursework may be applied to the elective requirements of this program's coursework option.

The Department of Civil and Environmental Engineering encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand. For students pursuing a concentration in geotechnical/geoenvironmental engineering, the two courses required by the concentration are offered in alternate years. To complete this certificate program in two years, one of the courses needs to be taken in the first year and the other in the second year.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CIVE 7301	Advanced Soil Mechanics	4
CIVE 7302	Advanced Foundation Engineering	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 24 semester hours from the electives list below. (p. 532)		24

PROJECT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
Complete 20 semester hours from the electives list below. (p. 532)		20

THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
Complete 16 semester hours from the electives list below. (p. 532)		16

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Electives List

Code	Title	Hours
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 5524	Vibration-Based Structural Health Monitoring	
CIVE 5536	Hydrologic and Hydraulic Design	
CIVE 7230	Legal Aspects of Civil Engineering	
CIVE 7240	Construction Equipment and Modeling	
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7260	Hydrologic Modeling	
CIVE 7311	Soil and Foundation Dynamics	
CIVE 7312	Earthquake Engineering	
CIVE 7313	Ground Improvement	
CIVE 7330	Advanced Structural Analysis	
CIVE 7331	Structural Dynamics	
IE 6200	Engineering Probability and Statistics	
IE 7290	Reliability Analysis and Risk Assessment	
ME 5657	Finite Element Method 1	

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Civil Engineering with Concentration in Structures, MSCivE (Boston)

For program contact information, please visit this website (<https://cee.northeastern.edu/academics/graduate-studies/ms-cive/>).

This program is designed for students with career goals in structural engineering and structural design. The program includes courses in structural analysis and design, structural mechanics, dynamics of structures, earthquake engineering, wind engineering, and structural health monitoring. The degree requirements include core courses from the Department of Civil and Environmental Engineering, complemented by electives in civil and environmental engineering, as well as electives from other departments such as mechanical and industrial engineering and mathematics.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	8 SH	8 SH	8 SH
Restricted electives	12 SH	12 SH	12 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Civil Engineering with Concentration in Structures with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Structures in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require fulfillment of the 8-semester-hour core curriculum and 12 semester hours of restricted electives from the structures concentration coursework. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 12 semester hours of the certificate coursework may be applied to the unrestricted elective requirements of this program's coursework option.

The Department of Civil and Environmental Engineering encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CIVE 7330	Advanced Structural Analysis	4
CIVE 7331	Structural Dynamics	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the restricted electives below.		12
Complete 12 semester hours from the other electives below.		12

PROJECT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
Complete 12 semester hours from the restricted electives below.		12
Complete 8 semester hours from the other electives below.		8

THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4

Complete 12 semester hours from the restricted electives below.

12

Complete 4 semester hours from the other electives below.

4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

Course Lists

RESTRICTED ELECTIVES LIST

Code	Title	Hours
CIVE 5522	Structural Systems Modeling	
CIVE 7155	Dynamics and Control of Infrastructure Systems	
CIVE 7302	Advanced Foundation Engineering	
CIVE 7312	Earthquake Engineering	
CIVE 7340	Seismic Analysis and Design	
CIVE 7341	Structural Reliability	
CIVE 7342	System Identification	
CIVE 7350	Behavior of Concrete Structures	
CIVE 7351	Behavior of Steel Structures	
CIVE 7354	Wind Engineering	
CIVE 7355	Advanced Bridge Design	
CIVE 7357	Advanced Structural Mechanics	
CIVE 7388	Special Topics in Civil Engineering (Random Data and Processing)	

OTHER ELECTIVES LIST

Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Code	Title	Hours
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5520	Structural Systems	
CIVE 5524	Vibration-Based Structural Health Monitoring	
CIVE 5525	Prestressed Concrete Design	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
CIVE 7301	Advanced Soil Mechanics	
CIVE 7311	Soil and Foundation Dynamics	
MATH 7241	Probability 1	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATL 7365	Properties and Processing of Electronic Materials	
ME 5240	Computer Aided Design and Manufacturing	
ME 5650	Advanced Mechanics of Materials	
ME 5654	Elasticity and Plasticity	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method 1	
ME 5658	Continuum Mechanics	
ME 5659	Control Systems Engineering	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 7238	Finite Element Method 2	
SBSY 5100	Sustainable Design and Technologies in Construction	
SBSY 5200	Sustainable Engineering Systems for Buildings	

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0

or ENCP 6954
or ENCP 6965
or ENCP 6955

Co-op Work Experience - Half-Time
Co-op Work Experience Abroad
Co-op Work Experience Abroad - Half-Time

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)
Minimum 3.000 GPA required

Civil Engineering with Concentration in Transportation, MSCivE (Boston)

This program is designed for students with career goals in transportation engineering and transportation planning. The degree requirements include core courses from the Department of Civil and Environmental Engineering (<https://cee.northeastern.edu/academics/graduate-studies/ms-cive/>), complemented by electives in civil and environmental engineering and by related courses in applied mathematics, engineering, economics, policy, and management.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	12 SH	12 SH	12 SH
Restricted electives	8 SH	8 SH	12 SH
Other electives	8 SH	4 SH	8 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Civil Engineering with Concentration in Transportation with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Transportation in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require fulfillment of the 12-semester-hour core curriculum and 8 semester hours of restricted electives from the transportation concentration coursework. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 4 semester hours of the certificate coursework may be applied to the restricted elective requirement and 12 semester hours of the certificate coursework may be applied to the unrestricted elective requirement of this program's coursework option.

The Department of Civil and Environmental Engineering encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CIVE 5373	Transportation Systems: Analysis and Planning	4
CIVE 5376	Traffic Engineering and Sustainable Urban Street Design	4
IE 6200	Engineering Probability and Statistics	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
	Complete 12 semester hours from the restricted electives list below. (p. 536)	12
	Complete 8 semester hours from the other electives list below. (p. 536)	8

REPORT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
Complete 8 semester hours from the restricted electives list below. (p. 536)		8
Complete 8 semester hours from the other electives list below. (p. 536)		8

THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
Complete 8 semester hours from the restricted electives list below. (p. 536)		8
Complete 4 semester hours from the other electives list below. (p. 536)		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

RESTRICTED ELECTIVES LIST

Code	Title	Hours
CIVE 6566	Sustainable Urban Transportation: Netherlands	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
CIVE 7380	Performance Models and Simulation of Transportation Networks	
CIVE 7381	Transportation Demand Forecasting and Model Estimation	
CIVE 7382	Advanced Traffic Control and Simulation	
CIVE 7385	Public Transportation	
CIVE 7387	Design Aspects of Roadway Safety	
IE 7215	Simulation Analysis	
IE 7280	Statistical Methods in Engineering	

OTHER ELECTIVES LIST

Code	Title	Hours
Any restricted elective not used to meet the restricted elective requirement can be used as another elective. Courses outside this list may be taken as electives with advisor approval.		
DAMG 6210	Data Management and Database Design	
IE 7275	Data Mining in Engineering	
IE 7290	Reliability Analysis and Risk Assessment	
MATH 7343	Applied Statistics	
OR 6205	Deterministic Operations Research	
OR 7230	Probabilistic Operation Research	
OR 7245	Network Analysis and Advanced Optimization	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

Civil Engineering with Concentration in Water, Environmental, and Coastal Systems, MSCivE (Boston)

This program integrates the study of infrastructure; hydrology; hydraulics; engineering for coastal areas; numerical modeling; remote sensing; spatial and temporal data analysis; and physical, chemical, and biological processes that impact the water and air quality to provide students with the knowledge and tools for developing and managing sustainable, resilient water resources and infrastructure. It includes required core courses from the Department of Civil and Environmental Engineering (<https://cee.northeastern.edu/academics/graduate-studies/ms-cive/>), complemented by electives in electrical and computer engineering, mechanical and industrial engineering, and earth and environmental sciences.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	8 SH	8 SH	8 SH
Restricted electives	12 SH	12 SH	12 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Civil Engineering with Concentration in Water, Environmental, and Coastal Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Water, Environmental, and Coastal Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require fulfillment of the 12-semester-hour core curriculum and 8 semester hours of restricted electives from the WECS concentration coursework. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 12 semester hours of the certificate coursework may be applied to the unrestricted elective requirement of this program's coursework option.

The Department of Civil and Environmental Engineering encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete 8 semester hours from the following:		8
CIVE 5281	Coastal Dynamics and Design	
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7260	Hydrologic Modeling	
CIVE 7281	Coastal and Nearshore Hydrodynamics	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the restricted electives list below. (p. 538)		12
Complete 12 semester hours from the other electives list below. (p. 538)		12

PROJECT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
Complete 12 semester hours from the restricted electives list below. (p. 538)		12
Complete 8 semester hours from the other electives list below. (p. 538)		8

THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
Complete 12 semester hours from the restricted electives list below. (p. 538)		12
Complete 4 semester hours from the other electives list below. (p. 538)		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Course Lists**RESTRICTED ELECTIVES LIST**

Code	Title	Hours
Any required core course not used to meet the required core course requirement can be taken as a restricted elective.		
CIVE 5250	Organic Pollutants in the Environment	
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5366	Air Quality Engineering and Science	
CIVE 5536	Hydrologic and Hydraulic Design	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7110	Critical Infrastructure Resilience	
CIVE 7255	Environmental Physical/Chemical Processes	
CIVE 7278	Air Quality Modeling and Forecasting	
CIVE 7279	Advanced Air Quality	
CIVE 7282	Coastal and Hydraulic Modeling	
ME 6200	Mathematical Methods for Mechanical Engineers 1	

OTHER ELECTIVES LIST

Code	Title	Hours
Any required core course not used to meet the required core course or restricted elective requirements can be taken as another elective. Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.		
CIVE 5100	Equity in Engineering	
CIVE 5150	Climate and Atmospheric Change	
CIVE 5260	Environmental Fluid Mechanics	
CIVE 5670	Global Biogeochemistry	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
CIVE 7388	Special Topics in Civil Engineering (Random Data and Processing)	
EECE 7204	Applied Probability and Stochastic Processes	
ENVR 5260	Geographical Information Systems	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
IE 7290	Reliability Analysis and Risk Assessment	
MATH 7341	Probability 2	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Environmental Engineering, MSEnVE (Boston)

This program integrates the study of physical, chemical, and biological processes and fundamental principles for water and wastewater treatment and disposal, hazardous waste management, surface water and groundwater quality, water resources management, and air quality management. Successful graduates will have the ability to develop and implement technologies for various environmental applications with the goal of improving and protecting the environment and human health. It includes required core courses from the Department of Civil and Environmental Engineering (<https://cee.northeastern.edu/academics/graduate-studies/ms-envi/>), complemented by electives in civil and environmental engineering, mechanical and industrial engineering, earth and environmental sciences, and mathematics.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core electives	12 SH	12 SH	12 SH
Restricted electives	8 SH	8 SH	12 SH
Other electives	8 SH	4 SH	8 SH
Master of Science project/thesis	4 SH	8 SH	

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Environmental Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Environmental Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved environmental engineering technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 12 semester hours of the certificate coursework may be applied to the restricted or unrestricted elective requirements of this program's coursework option.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete three of the following:		12
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 5368	Air Quality Management	
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7255	Environmental Physical/Chemical Processes	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the restricted electives list below. (p. 540)		12
Complete 8 semester hours from the other electives list below. (p. 540)		8

PROJECT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
Complete 8 semester hours from the restricted electives list below. (p. 540)		8
Complete 8 semester hours from the other electives list below. (p. 540)		8

THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
Complete 8 semester hours from the restricted electives list below. (p. 540)		8
Complete 4 semester hours from the other electives list below. (p. 540)		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Course Lists**RESTRICTED ELECTIVES LIST**

Code	Title	Hours
Any required core course not used to meet the required core course requirement can be taken as a restricted elective.		
CIVE 5250	Organic Pollutants in the Environment	
CIVE 5255	Tools and Techniques of Environmental Health	
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
CIVE 5366	Air Quality Engineering and Science	
CIVE 5369	Atmospheric Boundary Layer Flows	
CIVE 5536	Hydrologic and Hydraulic Design	
CIVE 7278	Air Quality Modeling and Forecasting	
CIVE 7279	Advanced Air Quality	
CIVE 7392	Special Topics in Environmental Engineering (Aquatic Biogeochemistry)	

OTHER ELECTIVES LIST

Code	Title	Hours
Any required core course not used to meet the required core course requirement can be taken as another elective. Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.		
CIVE 5100	Equity in Engineering	
CIVE 5150	Climate and Atmospheric Change	
CIVE 5260	Environmental Fluid Mechanics	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5670	Global Biogeochemistry	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7151	Urban Informatics and Processing	
CIVE 7260	Hydrologic Modeling	
EECE 7204	Applied Probability and Stochastic Processes	
ENVR 5190	Soil Science	
ENVR 5260	Geographical Information Systems	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
IE 7290	Reliability Analysis and Risk Assessment	

MATH 7241	Probability 1
MATH 7343	Applied Statistics
MATH 7344	Regression, ANOVA, and Design

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Sustainable Building Systems, MSSBS (Boston)

Website (<https://cee.northeastern.edu/academics/graduate-studies/ms-subs/>)

The sustainable building systems program focuses on the design and operation of buildings to provide a comfortable, healthy, and productive indoor environment with minimal energy and environmental impact. Students have an opportunity to develop leadership and decision-making skills to implement sustainable building practices in either the private or public sectors in the global market.

The graduates of the Master of Science in Sustainable Building Systems (<https://cee.northeastern.edu/academics/graduate-studies/ms-subs/>) program should display a high level of engineering knowledge in a broad range of architectural engineering, civil engineering, and construction management while embracing the concepts of engineering sustainability as related to energy and materials usage and the effects on the environment. Graduates will have the base training necessary to lead efforts within companies to plan and implement sustainable practices for the design and operation of buildings, realize energy and materials efficiency improvements, and minimize environmental impact. Upon graduation, students will have a theoretical background to the concepts behind the LEED (Leadership in Energy and Environmental Design) Green Associate examination.

Below is a typical course sequence for graduation in two semesters. The program is flexible to accommodate full-time students—who wish to proceed over a period of two to four semesters—and part-time students—who can complete the program requirements by taking one to two courses per semester, finishing the program in approximately four years.

Degree Requirements	With Project	With Thesis	Coursework Only
Core courses	12 SH	12 SH	12 SH
Restricted electives	8 SH	8 SH	8 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Sustainable Building Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Sustainable Building Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require fulfillment of the 12-semester-hour core curriculum and 8 semester hours of restricted electives from the sustainable building systems coursework. Students who concurrently enroll in the Graduate Certificate in Engineering Leadership may apply 12 semester hours of the certificate coursework to this program's unrestricted elective requirements.

The Civil and Environmental Engineering Department encourages students pursuing the Graduate Certificate in Engineering Leadership to complete their MS coursework requirements in their first year and their certificate requirements in their second year. Students who prefer to complete their certificate requirements in their first year should speak with their MS degree program coordinator prior to registration.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ARCH 5210 and ARCH 5211	Environmental Systems and Recitation for ARCH 5210	4
SBSY 5100	Sustainable Design and Technologies in Construction	4
SBSY 5200	Sustainable Engineering Systems for Buildings	4
Students must register for this 0-semester-hour course every semester.		
SBSY 5400	Sustainable Building Systems Seminar	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 8 semester hours from the restricted electives list below. (p. 542)		8
Complete 12 semester hours from the other electives list below. (p. 543)		12

PROJECT OPTION

Code	Title	Hours
SBSY 7945	Master's Project	4
Complete 8 semester hours from the restricted electives list below. (p. 542)		8
Complete 8 semester hours from the other electives list below. (p. 543)		8

THESIS OPTION

Code	Title	Hours
SBSY 7945	Master's Project	4
SBSY 7990	Thesis	4
Complete 8 semester hours from the restricted electives list below. (p. 542)		8
Complete 4 semester hours from the other electives list below. (p. 543)		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Electives

RESTRICTED ELECTIVES LIST

Code	Title	Hours
Complete 8 semester hours from the following:		
ARCH 5220	Integrated Building Systems	
CIVE 5221	Construction Project Control and Organization	
CIVE 5231	Alternative Project Delivery Systems in Construction	

CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure
CIVE 7220 or EMGT 5220	Construction Management Engineering Project Management
CIVE 7230	Legal Aspects of Civil Engineering
EMGT 6305	Financial Management for Engineers
SBSY 5250	Building Performance Simulation
SBSY 5300	Information Systems for Integrated Project Delivery

OTHER ELECTIVES LIST

Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Code	Title	Hours
Complete 12 semester hours from the following:		12
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
ACCT 6201	Financial Reporting and Managerial Decision Making 2	
CIVE 7151	Urban Informatics and Processing	
CIVE 7350	Behavior of Concrete Structures	
CIVE 7351	Behavior of Steel Structures	
CIVE 7388	Special Topics in Civil Engineering (Dynamics and Control of Infrastructure Systems)	
FINA 6200	Value Creation through Financial Decision Making	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
LPSC 7312	Cities, Sustainability, and Climate Change	

Climate and Engineering, Graduate Certificate (Boston)

Climate change is a defining challenge of the 21st century. This three-course certificate in climate and engineering provides students with the foundational knowledge of how climate change will impact engineered systems and approaches for adaptation at multiple scales. Students will also acquire the analytical skills to evaluate technologies and engineering approaches for safety, climate effectiveness, and equality in societal costs and benefits.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete one of the following:		4
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5699	Special Topics in Civil Engineering (Climate Technologies for Decarbonization, Mitigation, and Adaptation)	

Electives

Code	Title	Hours
Complete two of the following:		8
CIVE 5150	Climate and Atmospheric Change	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5670	Global Biogeochemistry	
CIVE 5699	Special Topics in Civil Engineering (Intro to Air Quality Engineering Science)	
CIVE 5699	Special Topics in Civil Engineering (Climate Technologies for Decarbonization, Mitigation, and Adaptation)	
CIVE 5984	Research (4 SH, with topic approval of program advisor)	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Sustainability Engineering, Graduate Certificate (Boston)

Overview

Society is facing increasingly complex and multidisciplinary challenges in balancing the relationship between the built environment and the earth system. The four-course certificate in sustainability engineering provides foundational knowledge that facilitates framing challenges and working on multidisciplinary topics to address sustainability challenges, including engineering perspectives, toolsets, and data methods.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Requirements

Code	Title	Hours
Complete one of the following:		4
CIVE 5150	Climate and Atmospheric Change	
CIVE 5250	Organic Pollutants in the Environment	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
Complete one of the following:		4
CIVE 5699	Special Topics in Civil Engineering (Intro to Air Quality Engineering Science - 4 semester hours)	
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
Complete one of the following:		4
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 6566	Sustainable Urban Transportation: Netherlands	
SBSY 5100	Sustainable Design and Technologies in Construction	
Complete one of the following:		4
CIVE 5373	Transportation Systems: Analysis and Planning	
CIVE 5984	Research (4 semester hours)	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7260	Hydrologic Modeling	
CIVE 7388	Special Topics in Civil Engineering (Random Data and Processing)	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Electrical and Computer Engineering

Website (<https://ece.northeastern.edu/>)

Edmund Yeh, PhD

Professor and Chair

409 Dana Research Center

617.373.7529

617.373.4431 (fax)

The Department of Electrical and Computer Engineering's graduate program is a dynamic and thriving center of world-recognized research in a wide range of areas. The department has strong ties to local industry and the world-famous hospitals and medical centers of Boston and is involved in many joint research projects with them. With five NSF- and DHS-funded research centers and over 20 industrial partners, faculty and students are actively conducting cutting-edge research in areas such as computer vision; pattern recognition and machine learning; brain-computer interface; computer architecture; high-performance computing; embedded systems; hardware and software security; power systems and power electronics; underwater communication networks and signal processing; robotics; information theory; communications, control, and signal processing; Internet

of Things; RF, electromagnetics, optics, and magnetic materials; micro/nanomechanical structures and advanced nanomaterials; power-first system/computer architecture; and ultralow power biomedical and neural circuits and systems.

ECE's graduate program educates MS and PhD students with deep fundamental and practical knowledge in the various disciplines of electrical and computer engineering by offering a strong curriculum and providing opportunities for research in these disciplines. The department educates the next generation of highly skilled engineers and researchers with necessary skills to address the future needs of academia, industry, government, and humanity.

Overview of Programs Offered

ECE's graduate program offers a Master of Science in Electrical and Computer Engineering, a Master of Science in Electrical and Computer Engineering Leadership, a Master of Science in Applied Physics and Engineering, a Master of Science in Data Science, a Master of Science in Robotics, a Master of Science in Internet of Things, a Master of Science in Wireless and Network Engineering, a Doctor of Philosophy in Computer Engineering, a Doctor of Philosophy in Cybersecurity, a Doctor of Philosophy in Electrical Engineering, and a Doctor of Philosophy in Interdisciplinary Engineering (housed in the College of Engineering).

Mission of the Department

The primary educational missions of the electrical and computer engineering department are to educate undergraduate students so they have the opportunity to obtain successful careers in electrical and computer engineering and related disciplines and pursue advanced graduate study in engineering or related disciplines. The mission of the graduate program is to educate graduate students so they have the skills to solve complex engineering problems and can make meaningful contributions to research and industry.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Master of Science in Electrical and Computer Engineering Leadership (p. 611) along with the Graduate Certificate in Engineering Leadership.

In addition, students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 1349) in combination with the Master of Science in Electrical and Computer Engineering. This option results in an increase in total hours beyond that required for the master's degree only.

Programs

Doctor of Philosophy (PhD)

- Computer Engineering (p. 546) (Boston)
- Cybersecurity (p. 418) (Boston)
- Electrical Engineering (p. 551) (Boston)
- Electrical Engineering (p. 553) (Oakland)
- Interdisciplinary Engineering (p. 486) (Boston)

Master of Science (MS)

- Applied Physics and Engineering (p. 557) (Boston)
- Artificial Intelligence (p. 164) (Boston)
- Data Science (p. 169) (Boston)
- Data Science—Align (p. 172) (Boston)
- Extended Realities (p. 175) (Boston)
- Internet of Things (p. 372) (Boston)
- Robotics (p. 180) (Boston)
- Robotics (p. 184) (Seattle)
- Semiconductor Engineering (p. 580) (Boston)
- Wireless and Network Engineering (p. 583) (Boston)

Master of Science in Electrical and Computer Engineering (MSECE)

- Concentration in Communications, Control, and Signal Processing (p. 585) (Boston)
- Concentration in Computer Systems and Software (p. 588) (Boston)
- Concentration in Computer Systems and Software (p. 590) (Seattle)
- Concentration in Computer Vision, Machine Learning, and Algorithms (p. 593) (Boston)
- Concentration in Computer Vision, Machine Learning, and Algorithms (p. 596) (Seattle)
- Concentration in Electromagnetics, Plasma, and Optics (p. 598) (Boston)
- Concentration in Hardware and Software for Machine Intelligence (p. 601) (Boston)

- Concentration in Hardware and Software for Machine Intelligence (p. 604) (Seattle)
- Concentration in Microsystems, Materials, and Devices (p. 606) (Boston)
- Concentration in Power Systems (p. 609) (Boston)

Master of Science in Electrical and Computer Engineering Leadership (MSECEL)

- Electrical and Computer Engineering Leadership (p. 611) (Boston)

Computer Engineering, PhD (Boston)

The Doctor of Philosophy in Computer Engineering offers students an opportunity for study in a broad range of areas in computer engineering. Details on PhD requirements can be found in the *Graduate Program Guide*. A summary of requirements is given below.

Qualifying Exam and Degree Candidacy

The PhD qualifying exam is the examination for admissions to the doctoral programs in electrical engineering and in computer engineering. The exam has the dual purposes of serving as an indicator of the student's capability for successful completion of the PhD in electrical engineering or in computer engineering and of serving as a guide to the student's advisor in developing a suitable plan of study, tailored to the individual needs of the student.

A student who has matriculated into the PhD program is considered a predoctoral student, whether they are BS entry or advanced entry. Upon successful completion of the qualifying exam, the student is designated a PhD candidate. A student who fails the qualifying exam will be permitted to retake the exam only one more time.

Annual Review

PhD students are reviewed annually. Each student is evaluated and receives a grade of satisfactory, needs improvement, or unsatisfactory.

Residence Requirement

After reaching PhD candidacy, one year of full-time graduate work or two consecutive years of part-time graduate work satisfy the university residence requirement. In the latter case, the student's advisor must approve a detailed schedule in order to ensure that the student devotes at least half of the time to the requirements of the Graduate School of Engineering.

Dissertation

Within one year of passing the PhD qualifying exam, the PhD candidate must form a dissertation committee. A dissertation committee must have at least three members that hold a PhD or equivalent degree. At least two of the committee members must be tenured or tenure-track Department of Electrical and Computer Engineering faculty, and the committee must include the student's advisor. The chair of the committee must be a tenured or tenure-track faculty member in the ECE department.

The dissertation committee must design an appropriate program of study that prepares the student to be a successful doctoral-level engineer as well as direct the candidate's dissertation research. The dissertation committee will approve the dissertation in final form.

DISSERTATION AND DISSERTATION CONTINUATION REGISTRATION

Upon successful completion of the PhD qualifying exam and the required coursework, the PhD candidate must register in two consecutive semesters for Dissertation Term 1 (EECE 9990) and Dissertation Term 2 (EECE 9991). Upon completion of this sequence, the student must register for Dissertation Continuation (EECE 9996) in every semester until the dissertation is completed. A student may not register for Continuation until they fulfill the two-semester sequence of Dissertation.

REGISTRATION REQUIREMENTS FOR PREDOCTORAL AND PHD CANDIDATE GRADUATE ASSISTANTS

The ECE department requires that predoctoral students and PhD candidates who hold research or teaching assistantships be registered full-time. Predoctoral PhD students may register for Research (EECE 9986) (zero credit, full-time equivalent) *if needed* to fulfill the registration requirement.

PHD PROPOSAL REVIEW

Each PhD candidate must demonstrate, by means of the proposal review, subject matter knowledge satisfactory for the award of the degree.

The proposal review is an oral presentation followed by a question-and-answer session administered by the student's dissertation advisor/committee. The proposal review will be given at the time the student submits their dissertation proposal to the dissertation advisor/committee for approval. As part of this exam, the dissertation advisor/committee will review the student's doctoral program and their performance in graduate courses, as well as examine the student on subject matter related to their graduate coursework and dissertation subject area.

FINAL DISSERTATION DEFENSE

The final dissertation defense will include the subject matter of the dissertation and significant developments in the field of the dissertation work. Other related fields may be included if recommended by the examining faculty. The dissertation defense must be scheduled at least six months after the PhD proposal review.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual departmental review (each fall semester after the student has been in the program for at least one year)
 Qualifying examination
 Dissertation committee
 Proposal stage review
 Dissertation defense

Core Requirements

Code	Title	Hours
Complete 32 semester hours of approved coursework—equivalent of MSECE degree. Then complete 16 semester hours, of which 8 must be graduate-level EECE courses. Consult faculty research advisor for acceptable courses.		48

Dissertation

Code	Title	Hours
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required
 Minimum 3.000 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review (each fall semester after the student has been in the program for at least one year)
 Qualifying examination
 Dissertation committee
 Proposal stage review
 Dissertation defense

Core Requirements

Complete 16 semester hours of approved coursework. At least 8 semester hours must be graduate-level EECE courses. Consult your faculty adviser for acceptable courses.

Dissertation

Code	Title	Hours
Complete the following two courses:		
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

16 total semester hours required
 Minimum 3.000 GPA required

Cybersecurity, PhD (Boston)

A research-based, interdisciplinary Doctor of Philosophy (PhD) in Cybersecurity combines a strong security technical foundation with a security policy and social sciences perspective. It seeks to prepare graduates to advance the state of the art of security in systems, networks, and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Students who choose the PhD in Cybersecurity program have a strong desire to pursue academic research solving critical cybersecurity challenges facing today's society. The PhD program is a natural path for students in the college's Master of Science in Cybersecurity (<http://www.ccs.neu.edu/graduate/degree-programs/m-s-in-information-assurance/>) program who want to pursue research and students with bachelor's degrees and an interest in research-focused careers. Students who pursue careers in advancing the state of the art of cybersecurity have an opportunity to gain:

- A strong technical foundation in cybersecurity and an interdisciplinary perspective based on policy and social science
- A path to a research-focused career coupled with depth in information assurance research at a leading institution, one of the earliest designees by NSA/DHS as a National Center of Academic Excellence in Information Assurance Research, Information Assurance/Cyber Defense, and Cyber Operations
- The opportunity to work with and learn from faculty who are recognized internationally for their expertise and contributions in information assurance from Northeastern University's Khoury College of Computer Sciences, the Department of Electrical and Computer Engineering, and the College of Social Sciences and Humanities
- Access to research projects at Northeastern's research centers focused on security.
 - The Cybersecurity and Privacy Institute (<https://cyber.ccis.northeastern.edu/about/>): The mission of Northeastern's Cybersecurity and Privacy Institute is to safeguard critical technology. Forging partnerships with experts in industry, government, and academia worldwide, the Institute's faculty and students develop, protect, and enhance technologies on which the world relies—from mobile devices and “smart” IoT applications to tomorrow's self-driving cars and delivery drones. Their expertise spans algorithm auditing; cloud security; cryptography; differential privacy; embedded device security; internet-scale security measurements; machine learning; big data; security, malware, and advanced threats; network protocols and security; web and mobile security; and wireless network security.
 - The International Secure Systems Lab (<http://www.iseclab.org/>), affiliated with Northeastern, a collaborative effort of European and U.S. researchers focused on web security, malware, and vulnerability analysis; intrusion detection; and other computer security issues.
 - The ALERT Center (<http://www.northeastern.edu/alert/>), where Northeastern is the lead institution, a multiuniversity Department of Homeland Security Center of Excellence involved in research, education, and technology related to threats from explosives.

The benefits of the Boston area:

- World-renowned for academic and research excellence, the Boston area is also home to some of the nation's largest Department of Defense contractors and government and independent labs such as MIT Lincoln Lab, MITRE, and Draper Lab.

Degree Requirements

The PhD in Cybersecurity degree requires completion of at least 48 semester hours beyond a bachelor's degree. Students who enter with an undergraduate degree will typically need four to five years to complete the program, and they will be awarded a master's degree en route to the PhD.

Doctoral Degree Candidacy

A student is considered a PhD degree candidate after completing the core courses with at least a 3.500 GPA, with no grades lower than a B in the core courses, and either publishing a paper in a strong conference or journal or passing an oral exam that is conducted by a committee of three cybersecurity faculty members and based on paper(s) written by the student.

RESIDENCY

One year of continuous full-time study is required after admission to the PhD candidacy. During this period, the student will be expected to make substantial progress in preparing for the comprehensive examination.

TEACHING REQUIREMENT

All cybersecurity PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester.

- Teaches at least three hours of classes
- Prepares at least one assignment or quiz or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

DISSERTATION ADVISING

The doctoral dissertation advising team for each student consists of two cybersecurity faculty members, one in a technical area. When appropriate, the second faculty advisor will be from the policy/social science area.

DISSERTATION COMMITTEE

With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD cybersecurity curriculum committee. The four members must include the advisor, two internal members, and an external member.

COMPREHENSIVE EXAMINATION

A PhD student must submit a written dissertation proposal and present it to the dissertation committee. The proposal should identify the research problem, the research plan, and the potential impact of the research on the field. The presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee after the public presentation.

DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in cybersecurity.

AWARDING OF MASTER'S DEGREES

Students who enter the PhD in Cybersecurity program with a bachelor's degree have the option of earning a master's degree from one of the departments participating in the program. To do so, they must meet all of the department's degree requirements.

Program Requirements**Bachelor's Degree Entrance**

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Teaching
 Qualifying exam and area exam
 Annual review
 Dissertation proposal
 Dissertation committee
 Dissertation defense

Core Requirements

A grade of B or higher is required in each core course. A cumulative 3.500 grade-point average is required for the core requirement.

Code	Title	Hours
Foundations		
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4
CY 5770	Software Vulnerabilities and Security	4
or EECE 5641	Introduction to Software Security	
CY 6740	Network Security	4
or EECE 5699	Computer Hardware and System Security	

Electives and Tracks

Code	Title	Hours

Note: Consult faculty advisor for other acceptable courses.

Tracks

Select at least two courses from one track: 8

Hardware Security

CS 6410	Compilers	
EECE 5666	Digital Signal Processing	
EECE 7352	Computer Architecture	
EECE 7364	Mobile and Wireless Networking	
EECE 7390	Computer Hardware Security	

Machine Learning

CS 5700	Fundamentals of Computer Networking	
CS 6140	Machine Learning	
CS 7150	Deep Learning	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	

Network Security

CY 6740	Network Security	
CS 7610	Foundations of Distributed Systems	
CS 7775	Seminar in Computer Security	
CY 5130	Computer System Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7336	Digital Communications	
EECE 7364	Mobile and Wireless Networking	
EECE 7374	Fundamentals of Computer Networks	

Systems Security

CS 6410	Compilers
CS 7600	Intensive Computer Systems
CS 7610	Foundations of Distributed Systems
CY 5130	Computer System Security
CY 6740	Network Security
CY 6760	Wireless and Mobile Systems Security
EECE 7352	Computer Architecture
<i>Theory</i>	
CS 7800	Advanced Algorithms
CS 7805	Complexity Theory
CS 7810	Foundations of Cryptography
CS 7870	Seminar in Theoretical Computer Science
EECE 7337	Information Theory
<i>Usable Security and Privacy</i>	
CS 6350	Empirical Research Methods
CS 6760	Privacy, Security, and Usability
CS 7340	Theory and Methods in Human Computer Interaction
INSH 6300	Research Methods in the Social Sciences
INSH 6302	Qualitative Methods
INSH 6500	Statistical Analysis
INSH 7400	Quantitative Analysis
<i>Cybersecurity Policy</i>	
CRIM 6200	Criminology
CRIM 6262	Evidence-Based Crime Policy
CY 5200	Security Risk Management and Assessment
CY 5210	Information System Forensics
CY 5250	Decision Making for Critical Infrastructure
POLS 7341	Security and Resilience Policy
Electives	
Selected in consultation with advisor from graduate-level CS and ECE courses and graduate-level courses offered by the College of Social Sciences and Humanities, including CRIM, CS, CY, DS, EECE, INSH, MATH and POLS.	
	28

Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Advanced Entry Program Requirements
Degree Requirements

Incoming PhD in Cybersecurity students who have already completed a Master of Science in an adjacent field may petition to the graduate program administration for advanced entry. Advanced entry petitions are reviewed by the program administration on a case-by-case basis. Please note that advanced entry does not waive by itself any part of the PhD coursework requirements. As a degree conferral requirement, a minimum of 16 semester hours of coursework beyond the 32 semester hours of the master’s degree is required of advanced entry PhD students (48 semester hours is required of standard entry PhD students). A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

Doctoral Degree Candidacy

Refer to the PhD Cybersecurity overview (p. 418) for admission to candidacy requirements.

Residency

Refer to the PhD Cybersecurity overview (p. 418) for residency requirements.

Teaching Requirement

Refer to the PhD Cybersecurity overview (p. 418) for teaching requirements.

Dissertation Advising

Refer to the PhD Cybersecurity overview (p. 418) for dissertation advising requirements.

Dissertation Committee

Refer to the PhD Cybersecurity overview (p. 418) for dissertation committee requirements.

Comprehensive Examination

Refer to the PhD Cybersecurity overview (p. 418) for comprehensive examination requirements.

Dissertation Defense

Refer to the PhD Cybersecurity overview (p. 418) for dissertation defense and completion requirements.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Teaching
Qualifying exam and area exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirement

Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each core course.

Code	Title	Hours
Consult your faculty advisor for approved courses.		16

Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	

Complete the following (repeatable) course until graduation:

CY 9996	Dissertation Continuation	

Program Credit/GPA Requirements

Minimum 16 semester hours required

Minimum 3.000 GPA required

Electrical Engineering, PhD (Boston)

The PhD program in electrical engineering offers students an opportunity for study in a broad range of areas in electrical engineering. Details on PhD requirements can be found in the *Graduate Program Guide*. A summary of requirements is given below.

Qualifying Exam and Degree Candidacy

The PhD qualifying exam is the examination for admissions to the doctoral programs in electrical engineering and in computer engineering. The exam has the dual purposes of serving as an indicator of the student's capability for successful completion of the PhD in electrical engineering or in computer engineering and of serving as a guide to the student's advisor in developing a suitable plan of study, tailored to the individual needs of the student.

A student who has matriculated into the PhD program is considered a predoctoral student, whether they are BS entry or advanced entry. Upon successful completion of the qualifying exam, the student is designated a PhD candidate. A student who fails the qualifying exam will be permitted to retake the exam only one more time.

Annual Review

PhD students are reviewed annually. Each student is evaluated and receives a grade of satisfactory, needs improvement, or unsatisfactory.

Residence Requirement

After reaching PhD candidacy, one year of full-time graduate work or two consecutive years of part-time graduate work satisfy the university residence requirement. In the latter case, the student's advisor must approve a detailed schedule in order to ensure that the student devotes at least half of the time to the requirements of the Graduate School of Engineering.

Dissertation

Within one year of passing the PhD qualifying exam, the PhD candidate must form a dissertation committee. A dissertation committee must have at least three members that hold a PhD or equivalent degree. At least two of the committee members must be tenured or tenure-track ECE faculty and the committee must include the student's advisor. The chair of the committee must be a tenured or tenure-track faculty member in the ECE department.

The dissertation committee must design an appropriate program of study that prepares the student to be a successful doctoral-level engineer as well as direct the candidate's dissertation research. The dissertation committee will approve the dissertation in final form.

DISSERTATION AND DISSERTATION CONTINUATION REGISTRATION

Upon successful completion of the PhD qualifying exam and the required coursework, the PhD candidate must register in two consecutive semesters for Dissertation Term 1 (EECE 9990) and Dissertation Term 2 (EECE 9991). Upon completion of this sequence, the student must register for Dissertation Continuation (EECE 9996) in every semester until the dissertation is completed. A student may not register for Continuation until they fulfill the two-semester sequence of Dissertation.

REGISTRATION REQUIREMENTS FOR PREDOCTORAL AND PHD CANDIDATE GRADUATE ASSISTANTS

The ECE department requires that predoctoral students and PhD candidates who hold research or teaching assistantships be registered full-time. Predoctoral PhD students may register for Research (EECE 9986) (zero credit, full-time equivalent) if needed to fulfill the registration requirement.

PHD PROPOSAL REVIEW

Each PhD candidate must demonstrate, by means of the proposal review, subject matter knowledge satisfactory for the award of the degree.

The proposal review is an oral presentation followed by a question-and-answer session administered by the student's dissertation advisor/committee. The proposal review will be given at the time the student submits their dissertation proposal to the dissertation advisor/committee for approval. As part of this exam, the dissertation advisor/committee will review the student's doctoral program and their performance in graduate courses, as well as examine the student on subject matter related to their graduate coursework and dissertation subject area.

FINAL DISSERTATION DEFENSE

The final dissertation defense will include the subject matter of the dissertation and significant developments in the field of the dissertation work. Other related fields may be included if recommended by the examining faculty. The dissertation defense must be scheduled at least six months after the PhD proposal review.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review (each fall semester after the student has been in the program for at least one year)

Qualifying examination

Dissertation committee

Proposal stage review

Dissertation defense

Core Requirements

Code	Title	Hours
Complete 32 semester hours of approved coursework—equivalent of MSECE degree. Then complete 16 semester hours, of which 8 must be graduate-level EECE courses. Consult your faculty research advisor for acceptable courses.		48

Dissertation

Code	Title	Hours
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review (each fall semester after the student has been in the program for at least one year)
 Qualifying examination
 Dissertation committee
 Proposal stage review
 Dissertation defense

Core Requirements

Complete 16 semester hours of approved coursework. At least 8 semester hours must be graduate-level EECE courses. Consult your faculty adviser for acceptable courses.

Dissertation

Code	Title	Hours
Complete the following two courses:		
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

16 total semester hours required
 Minimum 3.000 GPA required

Electrical Engineering, PhD (Oakland)

The PhD program in electrical engineering offers students an opportunity for study in a broad range of areas in electrical engineering. Details on PhD requirements can be found in the *Graduate Program Guide*. A summary of requirements is given below.

Qualifying Exam and Degree Candidacy

The PhD qualifying exam is the examination for admissions to the doctoral programs in electrical engineering and in computer engineering. The exam has the dual purposes of serving as an indicator of the student's capability for successful completion of the PhD in electrical engineering or in computer engineering and of serving as a guide to the student's advisor in developing a suitable plan of study, tailored to the individual needs of the student.

A student who has matriculated into the PhD program is considered a predoctoral student, whether they are BS entry or advanced entry. Upon successful completion of the qualifying exam, the student is designated a PhD candidate. A student who fails the qualifying exam will be permitted to retake the exam only one more time.

Annual Review

PhD students are reviewed annually. Each student is evaluated and receives a grade of satisfactory, needs improvement, or unsatisfactory.

Residence Requirement

After reaching PhD candidacy, one year of full-time graduate work or two consecutive years of part-time graduate work satisfy the university residence requirement. In the latter case, the student's advisor must approve a detailed schedule in order to ensure that the student devotes at least half of the time to the requirements of the Graduate School of Engineering.

Dissertation

Within one year of passing the PhD qualifying exam, the PhD candidate must form a dissertation committee. A dissertation committee must have at least three members that hold a PhD or equivalent degree. At least two of the committee members must be tenured or tenure-track ECE faculty and the committee must include the student's advisor. The chair of the committee must be a tenured or tenure-track faculty member in the ECE department.

The dissertation committee must design an appropriate program of study that prepares the student to be a successful doctoral-level engineer as well as direct the candidate's dissertation research. The dissertation committee will approve the dissertation in final form.

DISSERTATION AND DISSERTATION CONTINUATION REGISTRATION

Upon successful completion of the PhD qualifying exam and the required coursework, the PhD candidate must register in two consecutive semesters for Dissertation Term 1 (EECE 9990) and Dissertation Term 2 (EECE 9991). Upon completion of this sequence, the student must register for Dissertation Continuation (EECE 9996) in every semester until the dissertation is completed. A student may not register for Continuation until they fulfill the two-semester sequence of Dissertation.

REGISTRATION REQUIREMENTS FOR PREDOCTORAL AND PHD CANDIDATE GRADUATE ASSISTANTS

The ECE department requires that predoctoral students and PhD candidates who hold research or teaching assistantships be registered full-time. Predoctoral PhD students may register for Research (EECE 9986) (zero credit, full-time equivalent) if needed to fulfill the registration requirement.

PHD PROPOSAL REVIEW

Each PhD candidate must demonstrate, by means of the proposal review, subject matter knowledge satisfactory for the award of the degree.

The proposal review is an oral presentation followed by a question-and-answer session administered by the student’s dissertation advisor/committee. The proposal review will be given at the time the student submits their dissertation proposal to the dissertation advisor/committee for approval. As part of this exam, the dissertation advisor/committee will review the student’s doctoral program and their performance in graduate courses, as well as examine the student on subject matter related to their graduate coursework and dissertation subject area.

FINAL DISSERTATION DEFENSE

The final dissertation defense will include the subject matter of the dissertation and significant developments in the field of the dissertation work. Other related fields may be included if recommended by the examining faculty. The dissertation defense must be scheduled at least six months after the PhD proposal review.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

- Annual review (each fall semester after the student has been in the program for at least one year)
- Qualifying examination
- Dissertation committee
- Proposal stage review
- Dissertation defense

Core Requirements

Code	Title	Hours
Complete 32 semester hours of approved coursework—equivalent of MSECE degree. Then complete 16 semester hours, of which 8 must be graduate-level EECE courses. Consult your faculty research advisor for acceptable courses.		48

Dissertation

Code	Title	Hours
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

- 48 total semester hours required
- Minimum 3.000 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

- Annual review (each fall semester after the student has been in the program for at least one year)
- Qualifying examination
- Dissertation committee
- Proposal stage review
- Dissertation defense

Core Requirements

Complete 16 semester hours of approved coursework. At least 8 semester hours must be graduate-level EECE courses. Consult your faculty adviser for acceptable courses.

Dissertation

Code	Title	Hours
Complete the following two courses:		
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

- 16 total semester hours required
- Minimum 3.000 GPA required

Interdisciplinary Engineering, PhD (Boston)

130 Snell Engineering Center
617.373.2711

The College of Engineering offers an interdisciplinary engineering Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. This is an individually designed program for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with their faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern University's established degree standards but need not agree exactly with the regulations of individual units. Individually designed interdisciplinary degree programs must be approved by the appropriate graduate office(s).

The interdisciplinary engineering program admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements as well as all the required coursework.

Program Requirements

In order to pursue an individually designed interdisciplinary engineering graduate program, a student must have been accepted into the interdisciplinary engineering program by an approved graduate program that will serve as the administrative home unit for the interdisciplinary engineering program:

- Department of Bioengineering (p. 470)
- Department of Chemical Engineering (p. 499)
- Department of Civil and Environmental Engineering (p. 514)
- Department of Electrical and Computer Engineering (p. 544)
- Department of Mechanical and Industrial Engineering (p. 612)

Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary engineering PhD program with the department from which they were dismissed as either home or participating department.

The interdisciplinary engineering PhD program requires a commitment from a Northeastern faculty member to serve as the student's primary faculty advisor and chair of their interdisciplinary engineering PhD committee. The primary faculty member is affiliated with the program's administrative home unit unless otherwise approved by the administrative home unit. The PhD advisory committee must be assembled within the first semester of the program, and at least two units must be represented on the committee. The committee must include at least one faculty co-advisor from all participating academic units and otherwise conforms to the rules of the home unit. This committee will be responsible for overseeing the completion of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

Supplementary Interdisciplinary Engineering PhD Program Forms

Successful application and admission to the interdisciplinary engineering PhD program requires a completed Program Preliminary Study Plan, available on the COE Graduate Student Services Forms website. This form provides a memorandum of understanding for your proposed PhD including the primary departments and advisor(s), a brief description of the planned research, and explanation of the rationale for an interdisciplinary PhD program.

No later than one year postentry into the program, a completed and signed Interdisciplinary Program Plan must be submitted to the Graduate School of Engineering. This individually designed plan includes a list of courses to be taken, a description of the qualifying and comprehensive examination process to be used, a timeline, and any other requirements of the program. This form can be found on the COE Graduate Student Services Forms website.

Qualifying Examination and Degree Candidacy

Interdisciplinary engineering PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the other department(s) involved with the student's program of study. To qualify as an interdisciplinary engineering doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required coursework.

Dissertation

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary engineering PhD students must follow the dissertation guidelines of their home department.

Residency Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. Successful completion of the total interdisciplinary engineering PhD program depends on meeting department academic milestones and academic expectations.

Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

Program Requirements

Direct Entry

Complete all requirements listed below unless otherwise indicated.

Milestones

Interdisciplinary Engineering PhD Program Preliminary Study Plan Interdisciplinary Program Plan Dissertation committee formation

- Doctoral qualifying exams (both written comprehensive and oral area exams)
- Annual review
- Dissertation proposal
- Dissertation defense

Requirements

Code	Title	Hours
A minimum of 48 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		48

Dissertation Course Requirements

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters according to their academic home unit:

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

- 48 total semester hours required
- Minimum 3.000 GPA required

Advanced Entry Program Requirements

Advanced Entry

Complete all requirements listed below unless otherwise indicated.

Milestones

Interdisciplinary Engineering PhD Program Preliminary Study Plan Interdisciplinary Program Plan Dissertation committee formation Doctoral qualifying exams (both written comprehensive and oral area exams) Annual review Dissertation proposal Dissertation defense

Requirements

Code	Title	Hours
A minimum of 20 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		20

Dissertation Course Requirements

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters according to their academic home unit:

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

Applied Physics and Engineering, MS (Boston)

The combined MS program in applied physics and engineering allows graduate students to receive training in one of three concentrations of the electrical and computer engineering department while also receiving fundamental graduate-level physics training that is relevant to that area.

Thesis Option

Students may register for an additional two semesters of thesis work. Depending on the affiliation of the thesis advisor, students may register for Thesis (PHYS 7990) for a total of 8 semester hours or 4 semester hours of Master's Project (EECE 7945) followed by 4 semester hours of Thesis (EECE 7990). Thesis credits cannot be substituted for any of the coursework listed above. This option requires a total of 40 semester hours for the master's degree. A thesis committee is composed of an advisor and two faculty members from physics or electrical engineering.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Concentrations

Complete one of the following concentrations:

- Analysis, Modeling, and Computation (p. 558)
- Electromagnetics, Plasma, and Optics (p. 558)
- Microsystems, Materials, and Devices (p. 559)

Optional Thesis

Code	Title	Hours
Select one of the following options based on the college affiliation of the thesis advisor. Thesis coursework will not be applied to other requirements of this degree program. Completion of this thesis option requires a total of 40 semester hours to earn the degree:		8

Option 1 (College of Science thesis advisor)

PHYS 7990	Thesis (completed twice over two semesters)

Option 2 (College of Engineering thesis advisor)

EECE 7945	Master's Project
EECE 7990	Thesis

Program Credit/GPA Requirements

32 total semester hours required (40 with optional thesis)

Minimum 3.000 GPA required

ANALYSIS, MODELING, AND COMPUTATION

Code	Title	Hours
Core Courses		
EECE 7205	Fundamentals of Computer Engineering	4
PHYS 7321	Computational Physics	4
Engineering Coursework		
Complete 12 semester hours from the following:		12
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7374	Fundamentals of Computer Networks	
Physics Coursework		
Complete 12 semester hours from the following:		12
PHYS 5116	Network Science 1	
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7305	Statistical Physics	
PHYS 7335	Dynamical Processes in Complex Networks	

ELECTROMAGNETICS, PLASMA, AND OPTICS

Code	Title	Hours
Core Courses		
EECE 7203	Complex Variable Theory and Differential Equations	4
PHYS 7302	Electromagnetic Theory	4
Engineering Coursework		
Complete 12 semester hours from the following:		12
EECE 5698	Special Topics in Electrical and Computer Engineering (Subsurface Imaging)	
EECE 7105	Optics for Engineers	
EECE 7202	Electromagnetic Theory 1	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	
EECE 7293	Modern Imaging	
Physics Coursework		
Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7731	Physics of Biological Processes and Living Systems 1	

MICROSYSTEMS, MATERIALS, AND DEVICES

Code	Title	Hours
Core Courses		
EECE 7201	Solid State Devices	4
PHYS 7324	Condensed Matter Physics	4
Engineering Coursework		
Complete 12 semester hours from the following:		12
EECE 5606	Micro- and Nanofabrication	
EECE 5680	Electric Drives	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7240	Analog Integrated Circuit Design	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7353	VLSI Design	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering	
Physics Coursework		
Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7302	Electromagnetic Theory	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7734	Topics: Condensed Matter Physics	

Artificial Intelligence, MS (Boston)

The Master of Science in Artificial Intelligence provides a comprehensive framework encompassing foundational algorithms, theory, and practical applications in the rapidly evolving field of AI. This program offers students the essential knowledge and skills to design, develop, and implement AI systems across various high-demand sectors. The core curriculum is designed to provide in-depth understanding of fundamental AI concepts, forming a solid foundation for both theoretical and practical aspects of artificial intelligence.

Building on this strong foundation, students can delve into advanced AI applications through interdisciplinary concentrations tailored to industry needs. These concentrations include computer vision, continuous process engineering, machine learning, and robotics and agent-based systems.

The master's in artificial intelligence is an interdisciplinary degree offered by Khoury College of Computer Sciences and the College of Engineering. Descriptions of the concentrations offered in this degree are as follows:

- Computer Vision—College of Engineering
 - The computer vision concentration offers students the knowledge and skills to drive innovation at the intersection of new and emerging vision systems and AI, through utilizing AI and machine learning solutions for a wide range of applications including image enhancement/restoration, object recognition, navigation, graphics rendering, and pattern classification.
- Continuous Process Engineering—College of Engineering
 - The continuous process engineering concentration offers students the knowledge and skills to revolutionize how industrial processes are designed, monitored, and optimized. The program aims to prepare students to utilize AI and machine learning solutions to enhance process efficiency, predictive maintenance, and real-time decision making in industries such as chemicals, pharmaceuticals, and energy. Graduates will be prepared to integrate AI-driven solutions into continuous manufacturing environments to improve safety, sustainability, and productivity.
- Energy Systems—College of Engineering
 - The energy systems concentration offers students the knowledge and skills to drive innovation in sustainable and intelligent energy systems. Students examine how to utilize AI and machine learning solutions to support smart energy grid operations, integrate renewable energy sources, and create responsive and resilient systems.
- Machine Learning—Khoury College of Computer Sciences

- The goal of the machine learning concentration is to provide students with practical, hands-on experience in designing, implementing, and optimizing machine learning models for real-world applications. The curriculum positions graduates to pursue roles that leverage AI to drive innovation and efficiency in a wide variety of industries and domains.
- Robotics and Agent-Based Systems—Khoury College of Computer Sciences
 - The goal of the robotics and agent-based systems concentration is to provide students with expertise in designing and developing intelligent robotic systems and autonomous agents capable of performing complex tasks in dynamic environments. The curriculum positions graduates to pursue roles that contribute to innovations in automation, human-robot interaction, and intelligent systems design.

Students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their college of admission.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following:

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 5130	Applied Programming and Data Processing for AI	4
DADS 5200 or DS 5020	Mathematics for Machine Learning Introduction to Linear Algebra and Probability for Data Science	4
EECE 5644 or DADS 7275	Introduction to Machine Learning and Pattern Recognition Machine Learning and Data Analytics	4

Concentrations

Complete one of the following concentrations:

- Computer Vision (p. 165)—College of Engineering
- Continuous Process Engineering (p. 165)—College of Engineering
- Energy Systems (p. 165)—College of Engineering
- Machine Learning (p. 166)—Khoury College of Computer Sciences
- Robotics and Agent-Based Systems (p. 166)—Khoury College of Computer Sciences

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

COMPUTER VISION CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Complete 8 semester hours from the following:		8
EECE 5550	Mobile Robotics	
EECE 5554 or ME 5554	Robotics Sensing and Navigation Robotics Sensing and Navigation	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
Complete 4 semester hours from the following:		4
EECE 5645	Parallel Processing for Data Analytics	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering	
Capstone		
EECE 7945	Master's Project	4

CONTINUOUS PROCESS ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Students without a chemical engineering degree are advised to choose the 510X courses, which serve as a bridge from other degrees.		
Complete 8 semester hours from the following:		8
CHME 5101 and CHME 5102	Fundamentals of Chemical Engineering: Fluid, Heat, and Mass Transfer and Fundamentals of Chemical Engineering: Thermodynamics and Kinetics	
CHME 5510 and CHME 5515	Fundamentals in Process Safety Engineering and Process Safety Engineering for Biotechnology and Pharmaceutical Industries	
CHME 7600 and CHME 7601	Pharmaceutical Engineering I and Pharmaceutical Engineering II	
Complete 4 semester hours from the following:		4
CHEM 5641 and CHME 7901	Computational Chemistry and Journal Club in Chemical Engineering	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5520	Designing for Process Safety	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
IE 7270	Intelligent Manufacturing	
PHIL 5010	AI Ethics	
PHSC 5900	AI in Drug Discovery and Development	
Capstone		
CHME 6580	Artificial Intelligence for Process Engineering Capstone	4

ENERGY SYSTEMS CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Complete 12 semester hours from the following:		12
CHME 5621	Electrochemical Engineering	
CHME 5692	Carbon Capture, Utilization, and Storage	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5700	Renewable Energy Development	
ENSY 5800	Applications of Artificial Intelligence in Energy Systems	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5374	Special Topics in Mechanical Engineering	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
PHIL 5010	AI Ethics	
Capstone		
ME 7945	Master's Project	4

MACHINE LEARNING CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
CS 5800	Algorithms	4
Complete 8 semester hours from the following:		8
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
Capstone		
Complete 4 semester hours from the following:		4
CS 6170	AI Capstone	
CS 8674	Master's Project	

ROBOTICS AND AGENT-BASED SYSTEMS CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
CS 5800	Algorithms	4
Complete 8 semester hours from the following:		8
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
Capstone		
Complete 4 semester hours from the following:		4
CS 6170	AI Capstone	
CS 8674	Master's Project	

Data Science, MS (Boston)

Khoury College of Computer Sciences and the College of Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science—Align fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Engineering Theory and Modeling—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 113).

Data Science Core

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Programming with Data		
DS 5110	Essentials of Data Science	4
Algorithms		
CS 5800	Algorithms	4
or EECE 7205	Fundamentals of Computer Engineering	
Machine Learning		
CS 6140	Machine Learning	4
or EECE 5644	Introduction to Machine Learning and Pattern Recognition	
Interdisciplinary Capstone		
DS 5500	Data Science Capstone	4

Data Science Concentration Options

Complete one of the following concentrations:

- Computer Science (p. 170)—Khoury College of Computer Sciences
- Engineering Theory and Modeling (p.)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Complete 16 semester hours from the following: ¹		16
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7250	Information Visualization: Theory and Applications	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
CS 7990	Thesis	
CS 8674	Master's Project	
DS 7995	Project	

ENGINEERING THEORY AND MODELING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Foundational Courses		
Complete 4 semester hours from the following: ¹		4
DS 7995	Project	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7346	Probabilistic System Modeling and Analysis	
IE 6400	Foundations for Data Analytics Engineering	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
Translational and Advanced Courses		
Complete the remaining 12 semester hours from the following:		12
BIOE 5750	Modeling and Inference in Bioengineering	
BIOE 5880	Computational Methods in Systems Bioengineering	
BIOE 6200	Mathematical Methods in Bioengineering	
CHME 5137	Computational Modeling in Chemical Engineering	

CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences
CIVE 7100	Time Series and Geospatial Data Sciences
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering
EECE 5360	Combinatorial Optimization
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty
EECE 5626	Image Processing and Pattern Recognition
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5642	Data Visualization
EECE 5645	Parallel Processing for Data Analytics
EECE 7204	Applied Probability and Stochastic Processes
EECE 7215	Introduction to Distributed Intelligence
EECE 7223	Riemannian Optimization
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
EECE 7945	Master's Project
IE 5137	Computational Modeling in Industrial Engineering
IE 5390	Structured Data Analytics for Industrial Engineering
IE 5630	Biosensor and Human Behavior Measurement
IE 5640	Data Mining for Engineering Applications
IE 6400	Foundations for Data Analytics Engineering
IE 6600	Computation and Visualization for Analytics
IE 6700	Data Management for Analytics
IE 6750	Data Warehousing and Integration
IE 7270	Intelligent Manufacturing
IE 7275	Data Mining in Engineering
IE 7280	Statistical Methods in Engineering
IE 7295	Applied Reinforcement Learning in Engineering
IE 7300	Statistical Learning for Engineering
IE 7500	Applied Natural Language Processing in Engineering
IE 7615	Neural Networks and Deep Learning

¹ Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional hour, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Extended Realities, MS (Boston)

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality.

This program is structured to allow students flexibility and specialization to choose a path that matches their interest. Students have an opportunity to focus on a concentration area that matches their professional background and aspirations.

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their home college. The concentrations are associated with the following colleges:

- Khoury College of Computer Sciences
 - Artificial Intelligence
 - Human Computer Interaction
- D'Amore-McKim School of Business

- Entrepreneurship
- Marketing
- Bouvé College of Health Sciences
 - Human Movement Science
- College of Social Sciences and Humanities
 - Information Ethics
 - Public History
- College of Engineering
 - Wireless Networking
- College of Arts, Media and Design
 - XR and Design
 - XR and Games
 - XR and Media

The Master of Science in Extended Realities welcomes students from a diverse range of backgrounds because of the applications of XR technology used in many disciplines and industries including medicine, business, entertainment, architecture, and journalism.

Some concentrations may require a technical background and are noted in the requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Extended Reality Core

Code	Title	Hours
Required Courses		
EXRE 5010 and EXRE 5011	Immersive Media: Extended Realities (XR) History, Theory, and Impact and Seminar for EXRE 5010	5
EXRE 5020	Developing Extended Realities (XR)	4
EXRE 5030	Designing Extended Realities (XR)	4
EXRE 7500 or EXRE 7990	Extended Realities (XR) Project Thesis	4
GSND 5122	Business Models in the Game Industry	1

Extended Reality Concentration Options

Complete one of the following options:

- Artificial Intelligence (p. 176)—Khoury College of Computer Sciences
- Entrepreneurship (p. 176)—D'Amore-McKim School of Business
- Human Computer Interaction (p. 176)—Khoury College of Computer Sciences
- Human Movement Science (p. 176)—Bouvé College of Health Sciences
- Information Ethics (p. 177)—College of Social Sciences and Humanities
- Marketing (p. 177)—D'Amore-McKim School of Business
- Public History (p. 177)—College of Social Sciences and Humanities
- Wireless Networking (p. 178)—College of Engineering
- XR and Design (p. 178)—College of Arts, Media and Design
- XR and Games (p. 178)—College of Arts, Media and Design
- XR and Media (p. 178)—College of Arts, Media and Design

Program Credit/GPA Requirements

34 total semester hours required. Some concentrations may require more than 34 semester hours to complete.

Minimum 3.000 GPA required

CONCENTRATION IN ARTIFICIAL INTELLIGENCE—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Requires a background in computer science.		
CS 5097	Mixed Reality	4
CS 5100	Foundations of Artificial Intelligence	4

CS 6120	Natural Language Processing	4
CS 6140	Machine Learning	4
or DS 5220	Supervised Machine Learning and Learning Theory	

CONCENTRATION IN ENTREPRENEURSHIP—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
INNO 6200	Enterprise Growth and Innovation	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
GE 5030	Iterative Product Prototyping for Engineers	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

CONCENTRATION IN HUMAN COMPUTER INTERACTION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Required Courses		
CS 5340	Computer/Human Interaction	4
Electives		
Complete 12 semester hours from the following:		12
ARTG 5710	Design for Dignity	
CS 5097	Mixed Reality	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 6350	Empirical Research Methods	
CS 7390	Special Topics in Human-Centered Computing	
GSND 6340	Biometrics of Design	

CONCENTRATION IN HUMAN MOVEMENT SCIENCE—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
Required Courses		
GSND 6340	Biometrics of Design	4
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
Electives		
Complete 7–8 semester hours from the following:		7-8
PT 5133	Kinesiology	
PT 5150	Motor Control, Development, and Learning	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 5410	Functional Human Neuroanatomy	
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	
PT 7020	Technologies in Movement and Rehabilitation Science	

CONCENTRATION IN INFORMATION ETHICS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	

PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
Electives		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MARKETING—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

CONCENTRATION IN PUBLIC HISTORY—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
HIST 5237	Issues and Methods in Public History	4
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1 (to be taken twice)	
Electives		
Complete 8 semester hours from the following:		8
HIST 5241	Exhibits and Museums	
HIST 7250	Topics in Public History (Public History and Slavery)	
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)	

CONCENTRATION IN WIRELESS NETWORKING—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
EECE 5512	Networked XR Systems	
EECE 7374	Fundamentals of Computer Networks	
Electives		
Complete 8 semester hours from the following:		8
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	

CONCENTRATION IN XR AND DESIGN—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4

ARTG 5640	Prototyping for Experience Design	4
EXRE 6500	Extended Realities (XR) Studio	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN XR AND GAMES—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
Electives		
Complete 8 semester hours from the following:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6001	Advanced Topics in Game Science	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6330	Player Experience	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	
GSND 6460	Generative Game Design	

CONCENTRATION IN XR AND MEDIA—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics	
JRNL 6341	Telling Your Story with Data	

Plan of Study**Sample Plan of Study**

The following is a sample plan of study for a student in the Concentration in XR and Games.

Year 1			
Fall	Hours	Spring	Hours
EXRE 5010 and EXRE 5011		5 EXRE 5030	4
EXRE 5020		4 GSND 5110 and GSND 5111	5

Year 2

Fall	Hours	Spring	Hours
EXRE 6500		4 EXRE 7500	4
GSND 5122		1 XR and games elective 2	4
XR and games elective 1		4	
		9	8

Total Hours: 35**Internet of Things, MS (Boston)**

The Master of Science in Internet of Things is an interdisciplinary program administered by the Institute for the Wireless Internet of Things, the Department of Electrical and Computer Engineering, and the Khoury College of Computer Sciences. This program is aimed at preparing highly qualified researchers and a specialized workforce that will lead the development of a globally interconnected continuum of untethered devices and objects interacting with the physical environment, people, and each other. The program will provide students with the necessary knowledge and skills to understand, design, and implement autonomous wireless networked systems of tomorrow operating in uncertain, challenging, extreme environments through a combination of coursework, master project research, and/or industry experience.

Program Requirements**Fundamental Requirements**

Code	Title	Hours
EECE 5155	Wireless Sensor Networks and the Internet of Things	4
Complete one of the following:		4
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	
Complete one of the following:		4
CS 5800	Algorithms	
CS 7800	Advanced Algorithms	
EECE 7205	Fundamentals of Computer Engineering	
Complete one of the following:		4
CS 6140	Machine Learning	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning and Edge Computing in Wireless Networks)	
Complete one of the following:		4
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7390	Computer Hardware Security	
EECE 7368	High-Level Design of Hardware-Software Systems	
Complete one of the following for a total of 4 semester hours:		4
EECE 5698	Special Topics in Electrical and Computer Engineering (Spectrum Policy Issues for Wireless Communications Innovators)	
INNO 6230 and EECE 6400	Platform Innovation and Special Problems in Electrical and Computer Engineering	
HRMG 6280 and EECE 6400	The Human Side of Innovation and Special Problems in Electrical and Computer Engineering	
Complete one of the following:		4
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
EECE 5641	Introduction to Software Security	
EECE 5699	Computer Hardware and System Security	

Options**COURSEWORK OPTION**

Code	Title	Hours
Complete 4 semester hours from the electives course list below. (p. 373)		4

MASTER'S PROJECT OPTION

Code	Title	Hours
EECE 7945	Master's Project	4

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)
 Minimum 3.000 GPA required

Electives Course List

Any course in the following list will fulfill the coursework option, provided the student satisfies prerequisites and program requirements. Students can take courses outside this list with prior approval from the program director.

Code	Title	Hours
Courses in College of Engineering		
<i>Bioengineering</i>		
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
<i>Civil and Environmental Engineering</i>		
CIVE 5280	Remote Sensing of the Environment	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
CIVE 7380	Performance Models and Simulation of Transportation Networks	
<i>Electrical and Computer Engineering</i>		
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5360	Combinatorial Optimization	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5576	Wireless Communication Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Systems	
EECE 5666	Digital Signal Processing	
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	

EECE 5697	Acoustics and Sensing
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networked XR Systems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Spectrum Policy Issues for Wireless Communications Innovators)
EECE 5698	Special Topics in Electrical and Computer Engineering (Terahertz Communication for 6G)
EECE 5699	Computer Hardware and System Security
EECE 7150	Autonomous Field Robotics
EECE 7200	Linear Systems Analysis
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7240	Analog Integrated Circuit Design
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7275	Antennas and Radiation
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7390	Computer Hardware Security
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Communication Electronics)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances on Deep Learning)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Wireless Communications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (An Experimental Approach to Wireless Communications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning and Edge Computing in Wireless Networks)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Security in Large-Scaled Learning Enabled Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Network Systems and Applications)

Courses Outside College of Engineering**Khoury College of Computer Science***Computer Science*

CS 5700	Fundamentals of Computer Networking
CS 5800	Algorithms
CS 6140	Machine Learning

CS 7150	Deep Learning
CS 7800	Advanced Algorithms
<i>Cybersecurity</i>	
CY 5120	Applied Cryptography
CY 5130	Computer System Security
CY 5150	Network Security Practices
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
CY 6740	Network Security
CY 6760	Wireless and Mobile Systems Security
D'Amore-McKim School of Business	
<i>Entrepreneurship and Innovation</i>	
INNO 6200	Enterprise Growth and Innovation
INNO 6230	Platform Innovation
INNO 6222	Competing in Dynamic, Innovation-Driven Markets
<i>Entrepreneurship Technological</i>	
ENTR 6240	Emerging and Disruptive Technologies
ENTR 6300	Managing a Technology-Based Business
ENTR 6340	The Technical Entrepreneur as Leader
<i>Human Resources Management</i>	
HRMG 6280	The Human Side of Innovation
Bouvé College of Health Sciences	
<i>Health Informatics</i>	
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 5300	Personal Health Interface Design and Development
HINF 5301	Evaluating Health Technologies
HINF 6400	Introduction to Health Data Analytics
<i>Nursing</i>	
NRSG 6306	Health Informatics
College of Arts, Media and Design	
<i>Communication Studies</i>	
COMM 6605	Youth and Communication Technology
School of Law	
LW 6101	Introduction to Legal Studies 1: Law and Legal Reasoning
LW 6102	Introduction to Legal Studies 2
LW 6140	Data Regulation and Compliance
LW 6231	Identifying and Securing Intellectual Property Rights
LW 6232	Intellectual Property and Media
LW 6400	Law, Policy and Legal Argument
LW 7369	Intellectual Property
LW 7669	Law and Technology
College of Social Sciences and Humanities	
<i>Law and Public Policy</i>	
LPSC 7312	Cities, Sustainability, and Climate Change
<i>Philosophy</i>	
PHIL 5005	Information Ethics
<i>Political Science</i>	
POLS 7341	Security and Resilience Policy
POLS 7346	Resilient Cities
<i>Public Policy and Urban Affairs</i>	
PPUA 5262	Big Data for Cities
College of Science	

Physics

PHYS 5116

Network Science 1

Robotics, MS (Boston)

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics offers instruction by the faculty of the College of Engineering, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences. The program is designed to provide students with comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Biomedical and Rehabilitation Robotics—College of Engineering
- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

Gordon Institute of Engineering Leadership**Master's Degree in Robotics with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Robotics in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved robotics technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the certificate coursework may be applied to this program's elective requirements in the coursework option.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Electrical and Computer Engineering		
Complete one of the following:		4
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Computer Science		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

Concentrations

Complete one of the following options:

- Biomedical and Rehabilitation Robotics (p. 181)—College of Engineering
- Computer Science (p. 182)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 182)—College of Engineering
- Mechanical Engineering (p. 183)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required (33 total semester hours with participation in co-op in certain concentrations)

Minimum 3.000 GPA required

BIOMEDICAL AND REHABILITATION ROBOTICS CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
Complete one of the following:		4
BIOE 5520	Bioengineering Design for Robotic Rehabilitation	
PT 5170 and PT 5171	Motor Control and Lab for PT 5170	
PT 5321	Applications of Biomechanics in Human Function and Movement	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 183)		
<i>Project Option</i>		
Students working with Department of Physical Therapy, Movement, and Rehabilitation Sciences faculty should enroll in the PT course. Students working with Department of Bioengineering faculty should choose the BIOE course.		
BIOE 7945	Master's Project	
or PT 7995	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p. 183)		
<i>Thesis Option</i>		
Students working with Department of Physical Therapy, Movement, and Rehabilitation Sciences faculty should enroll in the PT course. Students working with Department of Bioengineering faculty should choose the BIOE course.		
BIOE 7945	Master's Project	
or PT 7995	Master's Project	
BIOE 7990	Thesis	
or PT 7990	Thesis	
Complete 8 semester hours of courses from the elective course list. (p. 183)		
Optional Co-op		
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.		
Required Course		
Complete one additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
Options		
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 183)		
<i>Project Option</i>		
CS 8674	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p. 183)		
<i>Thesis Option</i>		
CS 7990	Thesis	
CS 8674	Master's Project	
Complete 8 semester hours of courses from the elective course list. (p. 183)		

Optional Co-op

For students in the this concentration, please consult your academic advisor for co-op procedures.

ELECTRICAL AND COMPUTER ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours

Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional EECE course not used to fulfill the core requirements:		4

EECE 5550	Mobile Robotics
EECE 5552	Assistive Robotics
EECE 5554	Robotics Sensing and Navigation

Options

Complete one of the following options:	16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

EECE 7945	Master's Project

Complete 12 semester hours of courses from the elective course list. (p. 183)

Thesis Option

EECE 7945	Master's Project

EECE 7990	Thesis

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

Complete the following (students must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

MECHANICAL ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours

Students in the mechanical engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional ME course not used to fulfill the core requirements:		4

ME 5250	Robot Mechanics and Control
ME 5659	Control Systems Engineering

Options

Complete one of the following options:	16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

ME 7945	Master's Project

Complete 12 semester hours of courses from the elective course list. (p. 183)

Thesis Option

ME 7945	Master's Project

ME 7990	Thesis

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

Complete the following (students must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Elective Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)	
IE 6500	Human Performance	
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	
IE 7615	Neural Networks and Deep Learning	
ME 5240	Computer Aided Design and Manufacturing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5654	Elasticity and Plasticity	
ME 5655	Dynamics and Mechanical Vibration	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6250	Wearable Robotics	
ME 6260	Introduction to Microelectromechanical Systems (MEMS)	
ME 7247	Advanced Control Engineering	

PT 5170	Motor Control
PT 5321	Applications of Biomechanics in Human Function and Movement
PT 7001	Core Concepts in Rehabilitation Science and Research
PT 7005	Experimental Design and Applied Statistics
PT 7020	Technologies in Movement and Rehabilitation Science

Robotics, MS (Seattle)

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics is offered by the College of Engineering and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Electrical and Computer Engineering		
Complete one of the following:		4
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Computer Science		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

Concentrations

Complete one of the following concentrations:

- Computer Science (p. 185)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 185)—College of Engineering
- Mechanical Engineering (p. 186)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required (33 total semester hours with participation in co-op in certain concentrations)

Minimum 3.000 GPA required

CONCENTRATION IN COMPUTER SCIENCE

Code	Title	Hours
Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.		
Required Course		
Complete one additional CS course not used to fulfill the core requirements:		4

CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p.)		
<i>Project Option</i>		
CS 8674	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p.)		
<i>Thesis Option</i>		
CS 8674	Master's Project	
CS 7990	Thesis	
Complete 8 semester hours of courses from the elective course list. (p.)		

Optional Co-op

For students in the this concentration, please consult your academic advisor for co-op procedures.

CONCENTRATION IN ELECTRICAL AND COMPUTER ENGINEERING

Code	Title	Hours

Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional EECE course not used to fulfill the core requirements: 4

EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	

Complete one of the following options: 16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p.)

Project Option

EECE 7945 Master's Project

Complete 12 semester hours of courses from the elective course list. (p.)

Thesis Option

EECE 7945 Master's Project

EECE 7990 Thesis

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p.)

Optional Co-op

Complete the following (students in EECE and MIE concentrations must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

CONCENTRATION IN MECHANICAL ENGINEERING

Code	Title	Hours

Students in the mechanical engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional ME course not used to fulfill the core requirements: 4

ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	

Complete one of the following options: 16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p.)

Project Option

ME 7945	Master's Project
Complete 12 semester hours of courses from the elective course list. (p.)	
<i>Thesis Option</i>	
ME 7945	Master's Project
ME 7990	Thesis
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.	
Complete 8 semester hours of courses from the elective course list. (p.)	

Optional Co-op

Complete the following (students in EECE and MIE concentrations must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Elective Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
DS 5220	Supervised Machine Learning and Learning Theory	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)	
IE 6500	Human Performance	
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	
IE 7615	Neural Networks and Deep Learning	
ME 5240	Computer Aided Design and Manufacturing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5654	Elasticity and Plasticity	

ME 5655	Dynamics and Mechanical Vibration
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7247	Advanced Control Engineering

Semiconductor Engineering, MS (Boston)

The Master of Science in Semiconductor Engineering, offered by the Institute for NanoSystems Innovation—along with the Department of Electrical and Computer Engineering, the Department of Mechanical and Industrial Engineering, and the Department of Chemical Engineering in the College of Engineering—and the D'Amore-McKim School of Business, is designed to meet the burgeoning demand for skilled professionals in the semiconductor industry. This cutting-edge program aims to equip students with the knowledge and skills necessary to excel in this rapidly evolving field.

The national landscape is witnessing a significant uptick in interest in expanding the talent pool within the semiconductor sector, particularly following the enactment of the U.S. CHIPS and Science Act of 2022. This pivotal legislation has catalyzed a marked increase in the demand for engineers, drawing considerable attention from a wide array of companies to the semiconductor industry. There is a need for skilled workers to build new plants to increase and localize manufacturing capacity, design chips, and the tools that make the chips. This program is strategically positioned to address this growing need, offering a comprehensive educational experience that prepares our graduates to lead and innovate in this critical domain.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
NanoSystems		
Complete one of the following:		4
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7244 or ME 6260	Introduction to Microelectromechanical Systems (MEMS) Introduction to Microelectromechanical Systems (MEMS)	
Manufacturing		
Complete one of the following:		4
EECE 5606	Micro- and Nanofabrication	
MATL 7365	Properties and Processing of Electronic Materials	
ME 5630	Nano- and Microscale Manufacturing	
Innovation		
Complete four semester hours from the following. Students may not meet this requirement solely with directed study coursework:		4
BUSN 6379	Entrepreneurial Ecosystems	
BUSN 6389	Leading Global Virtual Innovation Teams	
CHME 5976	Directed Study	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
INNO 6200	Enterprise Growth and Innovation	
ME 5976	Directed Study	

Concentrations

Complete one of the following concentrations:

- Devices and NanoSystems (p. 581)
- Materials and Manufacturing (p. 581)

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1

ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

CONCENTRATION IN DEVICES AND NANOSYSTEMS

Code	Title	Hours
Complete two of the following not used to complete other requirements of this program:		8
EECE 5606	Micro- and Nanofabrication	
EECE 5651	Introduction to Photonic Devices	
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7244 or ME 6260	Introduction to Microelectromechanical Systems (MEMS) Introduction to Microelectromechanical Systems (MEMS)	
EECE 7250	Power Management Integrated Circuits	
EECE 7353	VLSI Design	
Complete one of the following options for 12 semester hours:		12
<i>Coursework Option</i>		
Complete 12 semester hours from the restricted electives course list. (p. 582)		
<i>Project Option</i>		
EECE 7945	Master's Project	
Complete 8 semester hours from the restricted electives course list. (p. 582)		
<i>Thesis Option</i>		
EECE 7945	Master's Project	
EECE 7990	Thesis	
Complete 4 semester hours from the restricted electives course list. (p. 582)		

CONCENTRATION IN MATERIALS AND MANUFACTURING

Code	Title	Hours
Complete two of the following not used to complete other requirements of this program:		8
CHME 5105	Materials Characterization Techniques	
IE 6200	Engineering Probability and Statistics	
IE 7270	Intelligent Manufacturing	
MATL 7365	Properties and Processing of Electronic Materials	
ME 5245	Mechatronic Systems	
ME 5620	Fundamentals of Advanced Materials	
ME 5630	Nano- and Microscale Manufacturing	
Complete one of the following options for 12 semester hours:		12
<i>Coursework Option</i>		
Complete 12 semester hours from the restricted electives course list. (p. 582)		
<i>Project Option</i>		
ME 7945 or CHME 7945 or IE 7945	Master's Project Master's Project Master's Project	
Complete 8 semester hours from the restricted electives course list. (p. 582)		
<i>Thesis Option</i>		
ME 7945 or CHME 7945 or IE 7945	Master's Project Master's Project Master's Project	

ME 7990	Thesis
or CHME 7990	Thesis
or IE 7990	Thesis

Complete 4 semester hours from the restricted electives course list. (p. 582)

Restricted Electives Course List

Any course in the following elective lists will fulfill the restricted elective requirement, provided the course has not already been applied to fulfill core requirements of this program and provided the student satisfies prerequisites. Students can take electives outside of these lists with prior approval from the faculty advisor.

Code	Title	Hours
Elective Courses in Engineering and Science		
CHME 5105	Materials Characterization Techniques	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5621	Electrochemical Engineering	
CHME 5642 and CHME 5643	Photochemistry Fundamentals and Applications and Photochemistry Lab	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering (BioMEM Systems)	
CHME 5699	Special Topics in Chemical Engineering (Carbon Capture Storage and Utilization)	
CHME 7340	Chemical Engineering Kinetics	
EECE 5606	Micro- and Nanofabrication	
EECE 5608	Magnetic Materials for Next-Generation Electronics	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5651	Introduction to Photonic Devices	
EECE 5652	Microwave Circuits and Systems	
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Quantum Engineering)	
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
or ME 6260	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7247	Radio Frequency Integrated Circuit Design	
EECE 7250	Power Management Integrated Circuits	
EECE 7296	Electronic Materials	
EECE 7353	VLSI Design	
EECE 7368	High-Level Design of Hardware-Software Systems	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Tech)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Low Power Integrated Circuits Design)	
IE 5617	Lean Concepts and Applications	
IE 5137	Computational Modeling in Industrial Engineering	
IE 6200	Engineering Probability and Statistics	
IE 6300	Manufacturing Systems Design	
IE 6700	Data Management for Analytics	
IE 7200	Supply Chain Engineering	
IE 7270	Intelligent Manufacturing	
IE 7280	Statistical Methods in Engineering	

IE 7285	Statistical Quality Control
IE 7290	Reliability Analysis and Risk Assessment
MATL 6250	Soft Matter
MATL 6290	Fundamentals of Nanostructured Materials
MATL 7365	Properties and Processing of Electronic Materials
ME 5240	Computer Aided Design and Manufacturing
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5520	Fundamentals and Applications of Optics and Photonics
ME 5600	Materials Processing and Process Selection
ME 5620	Fundamentals of Advanced Materials
ME 5630	Nano- and Microscale Manufacturing
ME 5640	Additive Manufacturing
PHYS 5114	Physics and Applications of Quantum Materials
PHYS 5125	Advanced Quantum Mechanics
PHYS 5260	Introduction to Nanoscience and Nanotechnology
PHYS 5318	Principles of Experimental Physics
PHYS 5352	Quantum Computation and Information

Elective Courses in Innovation

A maximum of 4 semester hours may be taken from the following:

FINA 6309	Foundations of Accounting and Finance
GE 5010	Customer-Driven Technical Innovation for Engineers
GE 5020	Engineering Product Design Methodology
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
HRMG 6200	Managing People and Organizations
HRMG 6230	Leading a Diverse and Inclusive Organization
HRMG 6280	The Human Side of Innovation
INNO 6200	Enterprise Growth and Innovation
MGMT 6213	Managing Ethics in the Workplace and Marketplace
MGMT 6225	Sustainability and Leadership
MGMT 6226	Sustainability and the Business Environment
MKTG 6200	Creating and Sustaining Customer Markets

FINA, HRMG, INNO, MGMT, and MKTG courses listed above are 3 semester hours, so students may take one additional 1 semester hour of courses from the list below for a total of 4 semester hours:

BUSN 6379	Entrepreneurial Ecosystems
BUSN 6389	Leading Global Virtual Innovation Teams
CHME 5976	Directed Study
ME 5976	Directed Study

Wireless and Network Engineering, MS (Boston)

Overview

The Master of Science in Wireless and Network Engineering is administered by the Institute for the Wireless Internet of Things and the Department of Electrical and Computer Engineering. This program is aimed at preparing highly qualified researchers and a specialized workforce that will lead the future of our hyperconnected society. The program will provide students with the necessary knowledge and skills to understand, design, and implement present and future wireless and wired communication networks through a combination of coursework, master's thesis research, and/or industry experience.

Program Requirements

Fundamental Requirements

Code	Title	Hours
Complete two of the following:		8
EECE 5576	Wireless Communication Systems	

EECE 7364	Mobile and Wireless Networking
EECE 7374	Fundamentals of Computer Networks

Options

COURSEWORK OPTION

Code	Title	Hours
Complete 24 semester hours from the concentration course list below. (p. 584)		24

THESIS OPTION

Code	Title	Hours
EECE 7945	Master's Project	4
EECE 7990	Thesis	4

Complete 16 semester hours from the concentration course list below. (p. 584) 16

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Elective Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the program director.

Code	Title	Hours
Electrical and Computer Engineering		
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5360	Combinatorial Optimization	
EECE 5610	Digital Control Systems	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5666	Digital Signal Processing	
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	
EECE 5697	Acoustics and Sensing	
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)	
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Spectrum Policy Issues for Wireless Communications Innovators)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Terahertz Communications for 6G)	

EECE 5699	Computer Hardware and System Security
EECE 6400	Special Problems in Electrical and Computer Engineering
EECE 7200	Linear Systems Analysis
EECE 7202	Electromagnetic Theory 1
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7275	Antennas and Radiation
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7352	Computer Architecture
EECE 7393	Analysis and Design of Data Networks
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Communication Electronics)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Wireless Communications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (An Experimental Approach to Wireless Communications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning and Edge Computing in Wireless Networks)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Security in Large-Scaled Learning Enabled Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Networks Systems and Applications)
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering
Computer Science	
CS 5520	Mobile Application Development
CS 5610	Web Development
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
CS 7610	Foundations of Distributed Systems
Cybersecurity	
CY 5001	Cybersecurity: Technologies, Threats, and Defenses
CY 5010	Cybersecurity Principles and Practices
CY 6740	Network Security

Electrical and Computer Engineering with Concentration in Communications, Control, and Signal Processing, MSECE (Boston)

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-elee/>).

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP**Master's Degree in Electrical and Computer Engineering with a Concentration in Communications, Control, and Signal Processing with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Electrical and Computer Engineering with a Concentration in Communications, Control, and Signal Processing in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved communications, control, and signal processing technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 SH of the certificate project may be applied to this program's thesis requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		8
EECE 5576	Wireless Communication Systems	
EECE 5666	Digital Signal Processing	
EECE 7200	Linear Systems Analysis	
EECE 7204	Applied Probability and Stochastic Processes	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Concentration Courses		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		16
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

THESIS OPTION

Code	Title	Hours
Thesis		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.		
Concentration Courses		
Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		8
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

In the coursework option a maximum of two courses may be taken outside of electrical and computer engineering. Thesis track students can take up to three courses outside of electrical and computer engineering.

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

CONCENTRATION COURSES

Code	Title	Hours
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5582	Making Systems Reliable—An Introduction to Coding Theory	
EECE 5610	Digital Control Systems	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5665	Signal Processing for Global Navigation Satellite Systems	
EECE 5666	Digital Signal Processing	
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Formal Methods for Dynamical Systems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Molecular Systems Biology Dynamic Modeling)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Spectrum Policy Issues for Wireless Communications Innovators)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Terahertz Communications for 6G)	
EECE 6400	Special Problems in Electrical and Computer Engineering (*For MSECE and PhD-BS students only)	
EECE 7200	Linear Systems Analysis	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7211	Nonlinear Control	
EECE 7213	System Identification and Adaptive Control	
EECE 7214	Optimal and Robust Control	
EECE 7215	Introduction to Distributed Intelligence	
EECE 7223	Riemannian Optimization	
EECE 7310	Modern Signal Processing	
EECE 7311	Two Dimensional Signal and Image Processing	
EECE 7315	Digital Image Processing	
EECE 7323	Numerical Optimization Methods	
EECE 7336	Digital Communications	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Communication Electronics)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Wireless Communications)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (An Experimental Approach to Wireless Communications)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Current Research in Nonlinear Systems)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Distributed Intelligence)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Systems Modeling and Analysis)	

EECE 7400	Advanced Special Problems in Electrical and Computer Engineering (*For PhD-AE students only)
ME 7247	Advanced Control Engineering

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours

Courses from the following subject areas may not count toward any concentration within the MSECE program:

CSYE, DAMG, INFO, TELE

The following CS courses may not count toward any concentration within the MSECE program:

CS 5010	Programming Design Paradigm
CS 5330	Pattern Recognition and Computer Vision
CS 5340	Computer/Human Interaction
CS 5520	Mobile Application Development
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5800	Algorithms
CS 6140	Machine Learning
CS 6350	Empirical Research Methods

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Computer Systems and Software, MSECE (Boston)

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-elee/>).

The master's degree programs in electrical and computer engineering offer in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on groundbreaking research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Electrical and Computer Engineering with Concentration in Computer Systems and Software with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science degree in Electrical and Computer Engineering with Concentration in Computer Systems and Software in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved computer systems and software technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 SH of the certificate project may be applied to this program's thesis requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		
EECE 5640	High-Performance Computing	8

EECE 7205	Fundamentals of Computer Engineering
EECE 7352	Computer Architecture
EECE 7376	Operating Systems: Interface and Implementation

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Concentration Courses		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		16
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

THESIS OPTION

Code	Title	Hours
Thesis		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.		
Concentration Courses		
Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		8
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	
ENCP 6964	Co-op Work Experience	
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Course Lists

A maximum of three courses may be taken outside of electrical and computer engineering.

CONCENTRATION COURSES

Code	Title	Hours
EECE 5552	Assistive Robotics	
EECE 5640	High-Performance Computing	
EECE 5643	Simulation and Performance Evaluation	
EECE 5698	Special Topics in Electrical and Computer Engineering (Nano-Computing System Design)	
EECE 5699	Computer Hardware and System Security	
EECE 6400	Special Problems in Electrical and Computer Engineering (*For MSECE and PhD-BS students only)	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7368	High-Level Design of Hardware-Software Systems	
EECE 7376	Operating Systems: Interface and Implementation	
EECE 7390	Computer Hardware Security	

EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Computer Architecture)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Compilers)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Field Programmable Gate Arrays in the Cloud)
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering (*For PhD-AE students only)
CS 5200	Database Management Systems
CS 5500	Foundations of Software Engineering
CS 5600	Computer Systems
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6650	Building Scalable Distributed Systems

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Computer Systems and Software, MSECE (Seattle)

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-eece/>).

The master's degree programs in electrical and computer engineering offer in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on groundbreaking research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		
EECE 5640	High-Performance Computing	8
EECE 7205	Fundamentals of Computer Engineering	
EECE 7352	Computer Architecture	
EECE 7376	Operating Systems: Interface and Implementation	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Concentration Courses		
Complete a minimum of 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement. Complete a minimum of 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement. (p. 591)		16
Electives		
Students may complete a maximum of 8 semester hours from either the concentration course list or a maximum of 8 semester hours from the elective course list.		8

THESIS OPTION

Code	Title	Hours
Thesis		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.		
Concentration Courses		
Complete a minimum of 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement. (p. 591)		8
Electives		
Students may complete a maximum of 8 semester hours from either the concentration course list or a maximum of 8 semester hours from the elective course list.		8

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Course Lists

A maximum of three courses may be taken outside of electrical and computer engineering.

CONCENTRATION COURSES

Code	Title	Hours
CS 5200	Database Management Systems	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6650	Building Scalable Distributed Systems	
EECE 5552	Assistive Robotics	
EECE 5640	High-Performance Computing	
EECE 5643	Simulation and Performance Evaluation	

EECE 5698	Special Topics in Electrical and Computer Engineering (Field Programmable Gate Arrays in the Cloud)
EECE 5698	Special Topics in Electrical and Computer Engineering (Nano-Computing System Design)
EECE 5699	Computer Hardware and System Security
EECE 6400	Special Problems in Electrical and Computer Engineering
EECE 7205	Fundamentals of Computer Engineering
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7376	Operating Systems: Interface and Implementation
EECE 7390	Computer Hardware Security
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Computer Architecture)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Compilers)
EECE 7945	Master's Project
EECE 7990	Thesis

Elective Courses

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6760	Privacy, Security, and Usability	
CS 7800	Advanced Algorithms	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
DS 5110	Essentials of Data Science	
EECE 5360	Combinatorial Optimization	
EECE 5512	Networked XR Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 6400	Special Problems in Electrical and Computer Engineering	
EECE 7150	Autonomous Field Robotics	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7215	Introduction to Distributed Intelligence	
EECE 7223	Riemannian Optimization	
EECE 7311	Two Dimensional Signal and Image Processing	
EECE 7315	Digital Image Processing	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7370	Advanced Computer Vision	
EECE 7393	Analysis and Design of Data Networks	

EECE 7397	Advanced Machine Learning
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering
IE 5360	Digital Manufacturing
MATH 7233	Graph Theory
PHIL 5010	AI Ethics

Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms, MSECE (Boston)

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-eece/>).

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved computer vision, machine learning, and algorithms technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the certificate project may be applied to this program's thesis requirements.

GALANTE ENGINEERING BUSINESS PROGRAM

Master's Degree in Electrical and Computer Engineering with Graduate Certificate in Engineering Business

Students may complete a Graduate Certificate in Engineering Business in addition to a Master of Science in Electrical and Computer Engineering with a concentration in Computer Vision, Machine Learning, and Algorithms. Students must apply and be admitted to the [Galante Engineering Business Program \(https://galante.sites.northeastern.edu/\)](https://galante.sites.northeastern.edu/) to pursue this option. The program requires the applicant to have earned, or be in a program to earn, a Bachelor of Science in Engineering from Northeastern University or another accredited university/college within the United States. Students must fulfill all academic requirements for the MSECE program in their concentration and may use some of their credits toward both the MS degree and the certificate. The certificate coursework, along with participation in cocurricular professional development elements, earns the Graduate Certificate in [Engineering Business \(p. 685\)](#). Students may **double count** up to 16 credits of their MSECE courses toward the Galante Graduate Certificate in Engineering Business. Additionally, students are allowed to take up to 8 credit hours from the [Galante Catalog \(p. 686\)](#) as part of their coursework.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		8
EECE 5554	Robotics Sensing and Navigation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7352	Computer Architecture	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Concentration Courses		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		16
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

THESIS OPTION

Code	Title	Hours
Thesis		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
Concentration Courses		
Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		8
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

Option Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	
ENCP 6964	Co-op Work Experience	
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Course Lists

A maximum of three courses may be taken outside of electrical and computer engineering.

CONCENTRATION COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 7800	Advanced Algorithms	
DS 5110	Essentials of Data Science	
DS 5983	Topics in Data Science	
EECE 5360	Combinatorial Optimization	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5698	Special Topics in Electrical and Computer Engineering (Formal Methods for Dynamical Systems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Visual Sensing & Computing Co-Design Edge Machine Perception)	

EECE 6400	Special Problems in Electrical and Computer Engineering (*For MSECE and PhD-BS students only)
EECE 7150	Autonomous Field Robotics
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7215	Introduction to Distributed Intelligence
EECE 7223	Riemannian Optimization
EECE 7311	Two Dimensional Signal and Image Processing
EECE 7315	Digital Image Processing
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Deep Learning)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning for Embedded Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Distributed Intelligence)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Flexible Robotics)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Human Centered Computing)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Large Language Model Based Dialogue Agents)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Machine Learning with Small Data)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Security in Large-Scale Learning-Enabled Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Verifiable Machine Learning)
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering (*For PhD-AE students only)
MATH 7233	Graph Theory

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms, MSECE (Seattle)For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-elee/>).

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. A maximum of three courses outside of the EECE (Electrical and Computer Engineering) subject code may be applied to requirements of this program.

Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		8
EECE 5554	Robotics Sensing and Navigation	4
EECE 5644	Introduction to Machine Learning and Pattern Recognition	4
EECE 7205	Fundamentals of Computer Engineering	4
EECE 7352	Computer Architecture	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Concentration Courses		
Complete a minimum of 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement. (p. 597)		16
Electives		
Students may complete a maximum of 8 semester hours from either the concentration course list or a maximum of 8 semester hours from the elective course list.		8

THESIS OPTION

Code	Title	Hours
Thesis		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.		
Concentration Courses		
Complete a minimum of 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		8
Electives		
Students may complete a maximum of 8 semester hours from either the concentration course list or a maximum of 8 semester hours from the elective course list.		8

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	

or ENCP 6955

Co-op Work Experience Abroad - Half-Time

or ENCP 6965

Co-op Work Experience Abroad

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Course Lists

A maximum of three courses may be taken outside of electrical and computer engineering.

CONCENTRATION COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 7800	Advanced Algorithms	
DS 5110	Essentials of Data Science	
DS 5983	Topics in Data Science	
EECE 5360	Combinatorial Optimization	
EECE 5512	Networked XR Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5698	Special Topics in Electrical and Computer Engineering (Formal Methods of Dynamical Systems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Visual Sensing & Computing Co-Design Edge Machine Perception)	
EECE 6400	Special Problems in Electrical and Computer Engineering	
EECE 7150	Autonomous Field Robotics	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7215	Introduction to Distributed Intelligence	
EECE 7223	Riemannian Optimization	
EECE 7311	Two Dimensional Signal and Image Processing	
EECE 7315	Digital Image Processing	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7352	Computer Architecture	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Deep Learning)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning for Embedded Systems)	

EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Distributed Intelligence)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Flexible Robotics)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Human Centered Computing)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Large Language Model Based Dialogue Agents)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Machine Learning with Small Data)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Security in Large-Scaled Learning Enabled Systems)
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering
EECE 7945	Master's Project
EECE 7990	Thesis
MATH 7233	Graph Theory

ELECTIVE COURSES

Code	Title	Hours
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5335	Robotic Science and Systems	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6650	Building Scalable Distributed Systems	
CS 6760	Privacy, Security, and Usability	
CS 7340	Theory and Methods in Human Computer Interaction	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
EECE 5552	Assistive Robotics	
EECE 5641	Introduction to Software Security	
EECE 5643	Simulation and Performance Evaluation	
EECE 5699	Computer Hardware and System Security	
EECE 7353	VLSI Design	
EECE 7368	High-Level Design of Hardware-Software Systems	
EECE 7376	Operating Systems: Interface and Implementation	
EECE 7390	Computer Hardware Security	
EECE 7393	Analysis and Design of Data Networks	
IE 5360	Digital Manufacturing	
PHIL 5010	AI Ethics	

Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics, MSECE (Boston)

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-elee/>).

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved electromagnetics, plasma, and optics technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the certificate project may be applied to this program's thesis requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		8
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	
EECE 7202	Electromagnetic Theory 1	
EECE 7203	Complex Variable Theory and Differential Equations	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
A maximum of two courses may be taken outside of electrical and computer engineering.		
Concentration Courses		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		16
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of electrical and computer engineering.		
Thesis		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
Concentration Courses		
Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		8
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	
ENCP 6964	Co-op Work Experience	

600 Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics, MSECE (Boston)

or ENCP 6954 Co-op Work Experience - Half-Time
or ENCP 6955 Co-op Work Experience Abroad - Half-Time
or ENCP 6965 Co-op Work Experience Abroad

Course Lists

CONCENTRATION COURSES

Code	Title	Hours
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5608	Magnetic Materials for Next-Generation Electronics	
EECE 5651	Introduction to Photonic Devices	
EECE 5652	Microwave Circuits and Systems	
EECE 5654	Design and Prototyping of Optical Systems for Engineering Applications	
EECE 5692	Antennas for Wireless Communication and Sensing	
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	
EECE 5697	Acoustics and Sensing	
EECE 5698	Special Topics in Electrical and Computer Engineering (Design and Prototyping of Optical Systems for Engineering Applications)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Magnetic Materials and Devices for Microwave Engineering)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Photonic Devices for Communication Systems)	
EECE 6400	Special Problems in Electrical and Computer Engineering (*For MSECE and PhD-BE students only)	
EECE 7202	Electromagnetic Theory 1	
EECE 7203	Complex Variable Theory and Differential Equations	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	
EECE 7284	Optical Properties of Matter	
EECE 7293	Modern Imaging	
EECE 7296	Electronic Materials	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Technologies)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Photonic Circuit Design for Information Processing)	
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering (*For PhD-AE students only)	

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence, MSECE (Boston)

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the Program Requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved hardware and software for machine intelligence technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the certificate project may be applied to this program's thesis requirements.

GALANTE ENGINEERING BUSINESS PROGRAM

Master's Degree in Electrical and Computer Engineering with Graduate Certificate in Engineering Business

Students may complete a Graduate Certificate in Engineering Business in addition to a Master of Science in Electrical and Computer Engineering with a Concentration in Hardware and Software for Machine Intelligence. Students must apply and be admitted to the [Galante Engineering Business Program \(https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fgalante.sites.northeastern.edu%2F&data=05%7C02%7Cp.krafka%40northeastern.edu%7C869786b563fc4a47d3f108dd1a14fefe%7Ca8eec281aaa34daeac9b9a398b9215e7%7C0%7C0%7C638695399708426107%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIlwLjAuMDAwMCIslIAiOiJXaW4zMlIsIkFOljojTWFPbCIsIlldUljoyfQ%3D%3D%7C0%7C%7C%7C&sdata=XtG563pylBB6%2BaE000VogeSlrFYCBqqGfO8r13hR1RU%3D&reserved=0\)](https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fgalante.sites.northeastern.edu%2F&data=05%7C02%7Cp.krafka%40northeastern.edu%7C869786b563fc4a47d3f108dd1a14fefe%7Ca8eec281aaa34daeac9b9a398b9215e7%7C0%7C0%7C638695399708426107%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIlwLjAuMDAwMCIslIAiOiJXaW4zMlIsIkFOljojTWFPbCIsIlldUljoyfQ%3D%3D%7C0%7C%7C%7C&sdata=XtG563pylBB6%2BaE000VogeSlrFYCBqqGfO8r13hR1RU%3D&reserved=0) to pursue this option. The program requires the applicant to have earned, or be in a program to earn, a Bachelor of Science in Engineering from Northeastern University or another accredited university/college within the United States. Students must fulfill all academic requirements for the MSECE program in their concentration and may use some of their credits toward both the MS degree and the certificate. The certificate coursework, along with participation in cocurricular professional development elements, earns the Graduate Certificate in Engineering Business (p. 685). Students may **double count** up to 16 credits of their MSECE courses toward the Galante Graduate Certificate in Engineering Business. Additionally, students are allowed to take up to 8 credit hours from the [Galante Catalog \(p. 686\)](#) as part of their coursework.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		8
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of the electrical and computer engineering EECE subject code.		
Concentration Courses		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		16
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of electrical and computer engineering.		
Thesis		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
Concentration Courses		
Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		8
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	
ENCP 6964	Co-op Work Experience	
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Course Lists**CONCENTRATION COURSES**

Code	Title	Hours
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
CS 7340	Theory and Methods in Human Computer Interaction	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security (*Students taking EECE 5641 can't receive credit for CY 5770)	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5698	Special Topics in Electrical and Computer Engineering (Formal Methods for Dynamical Systems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Visual Sensing & Computing Co-Design Edge Machine Perception)	

EECE 5699	Computer Hardware and System Security
EECE 6400	Special Problems in Electrical and Computer Engineering (*For MSECE and PhD-BS students only)
EECE 7150	Autonomous Field Robotics
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7215	Introduction to Distributed Intelligence
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Deep Learning)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning Embedded Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Flexible Robotics)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Human Centered Computing)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Large Language Model Based Dialogue Agent)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robotics)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Machine Learning with Small Data)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Verifiable Machine Learning)
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering (*For PhD-AE students only)
IE 5360	Digital Manufacturing
MATH 7233	Graph Theory
PHIL 5010	AI Ethics

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence, MSECE (Seattle)

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. A maximum of three courses from subject codes other than EECE (Electrical and Computer Engineering) may be applied to requirements of this program.

Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		8
EECE 5644	Introduction to Machine Learning and Pattern Recognition	4
EECE 7205	Fundamentals of Computer Engineering	4
EECE 7352	Computer Architecture	4
EECE 7353	VLSI Design	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Concentration Courses		
Complete a minimum of 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		16
Elective Courses		
Students may complete a maximum of 8 semester hours from either the concentration course list or a maximum of 8 semester hours from the elective course list.		8

THESIS OPTION

Code	Title	Hours
Thesis		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.		
Concentration Courses		
Complete a minimum of 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		8
Electives		
Students may complete a maximum of 8 semester hours from either the concentration course list or a maximum of 8 semester hours from the elective course list.		8

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Course Lists

A maximum of three courses may be taken outside of electrical and computer engineering.

CONCENTRATION COURSES

Code	Title	Hours
EECE 5512	Networked XR Systems	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5698	Special Topics in Electrical and Computer Engineering (Formal Methods for Dynamical Systems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Visual Sensing & Computing Co-Design Edge Machine Perception)	
EECE 5699	Computer Hardware and System Security	
EECE 6400	Special Problems in Electrical and Computer Engineering	
EECE 7150	Autonomous Field Robotics	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7215	Introduction to Distributed Intelligence	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7368	High-Level Design of Hardware-Software Systems	
EECE 7370	Advanced Computer Vision	
EECE 7390	Computer Hardware Security	
EECE 7397	Advanced Machine Learning	
EECE 7393	Analysis and Design of Data Networks	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Deep Learning)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning Embedded Systems)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Flexible Robotics)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Human Centered Computing)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Large Language Model Based Dialogue Agent)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robotics)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Machine Learning with Small Data)	
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering	
EECE 7945	Master's Project	
EECE 7990	Thesis	

CS 5180	Reinforcement Learning and Sequential Decision Making
CS 5335	Robotic Science and Systems
CS 7340	Theory and Methods in Human Computer Interaction
IE 5360	Digital Manufacturing
MATH 7233	Graph Theory
PHIL 5010	AI Ethics

ELECTIVE COURSES

Code	Title	Hours
EECE 5360	Combinatorial Optimization	
EECE 5626	Image Processing and Pattern Recognition	
EECE 7223	Riemannian Optimization	
EECE 7311	Two Dimensional Signal and Image Processing	
EECE 7315	Digital Image Processing	
EECE 7376	Operating Systems: Interface and Implementation	
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6650	Building Scalable Distributed Systems	
CS 6760	Privacy, Security, and Usability	
CS 7800	Advanced Algorithms	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
DS 5110	Essentials of Data Science	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices, MSECE (Boston)

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-eele/>).

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP**Master's Degree in Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate

Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved microsystems, materials, and devices technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the certificate project may be applied to this program's thesis requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		8
EECE 5606	Micro- and Nanofabrication	
EECE 7201	Solid State Devices	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7353	VLSI Design	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Concentration Courses		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		16
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

THESIS OPTION

Code	Title	Hours
Thesis		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
Concentration Courses		
Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		8
Electives		
Complete 8 semester hours from either concentration courses or from other concentrations.		8

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	
ENCP 6964	Co-op Work Experience	
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Course Lists

In the coursework option, a maximum of two courses may be taken outside of electrical and computer engineering. Thesis track students can take up to three courses outside of electrical and computer engineering.

CONCENTRATION COURSES

Code	Title	Hours
EECE 5161	Thin Film Technologies	
EECE 5606	Micro- and Nanofabrication	
EECE 5608	Magnetic Materials for Next-Generation Electronics	

EECE 5647	Nanophotonics
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology
EECE 5651	Introduction to Photonic Devices
EECE 5652	Microwave Circuits and Systems
EECE 5653	Introduction to Quantum Engineering
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Flexible and Printed Electronics)
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Organic and Printed Electronics)
EECE 5698	Special Topics in Electrical and Computer Engineering (Magnetic Materials and Devices for Microwave Engineering)
EECE 5698	Special Topics in Electrical and Computer Engineering (Photonic Devices for Communication Systems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Semiconductor Packaging)
EECE 5698	Special Topics in Electrical and Computer Engineering (Visual Sensing & Computing Co-Design Edge Machine Perception)
EECE 6400	Special Problems in Electrical and Computer Engineering (*For MSECE and PhD-BS students only)
EECE 7201	Solid State Devices
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7284	Optical Properties of Matter
EECE 7296	Electronic Materials
EECE 7353	VLSI Design
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Technologies)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Communication Electronics)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Low Power Integrated Circuits Design)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Photonic Circuit Design for Information Processing)
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering (*For PhD-AE students only)

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	

CS 6140

Machine Learning

CS 6350

Empirical Research Methods

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Electrical and Computer Engineering with Concentration in Power Systems, MSECE (Boston)

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-elee/>).

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

Excluded Courses for All MSECE Concentrations

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Electrical and Computer Engineering with Concentration in Power Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Power Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved power systems technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the certificate project may be applied to this program's thesis requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		8
EECE 5680	Electric Drives	
EECE 5682	Power Systems Analysis 1	
EECE 5684	Power Electronics	
EECE 7200	Linear Systems Analysis	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Concentration Courses		
Complete 16 semester hours from the concentration course list below. (p. 610)		16
Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		

Electives

Complete 8 semester hours from either concentration courses or from other concentrations.	8

THESIS OPTION

Code	Title	Hours
Thesis		
EECE 7945	Master's Project	4

EECE 7990	Thesis	4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Concentration Courses

Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.	8

Electives

Complete 8 semester hours from either concentration courses or from other concentrations.	8

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Course Lists

In the coursework option a maximum of two courses may be taken outside of electrical and computer engineering. Thesis track students can take up to three courses outside of electrical and computer engineering.

CONCENTRATION COURSES

Code	Title	Hours
EECE 5580	Classical Control Systems	
EECE 5610	Digital Control Systems	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
EECE 5686	Electrical Machines	
EECE 5688	Analysis of Unbalanced Power Grids	
EECE 5690	Electric Vehicle Powertrains	
EECE 5698	Special Topics in Electrical and Computer Engineering (Electric Vehicles)	
EECE 6400	Special Problems in Electrical and Computer Engineering (*For MSECE and PhD-BS students only)	
EECE 7200	Linear Systems Analysis	
EECE 7211	Nonlinear Control	
EECE 7213	System Identification and Adaptive Control	
EECE 7214	Optimal and Robust Control	
EECE 7224	Power Systems State Estimation	
EECE 7226	Modeling and Simulation of Power System Transients	
EECE 7250	Power Management Integrated Circuits	
EECE 7323	Numerical Optimization Methods	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Power System Constrained Optimization)	
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering (*For PhD-AE students only)	

EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Electrical and Computer Engineering Leadership, MSECEL (Boston)

The Gordon Engineering Leadership Program is a transformational, technical, and challenging graduate-level learning experience targeted for engineering professionals.

The Gordon Institute, in collaboration with the College of Engineering, offers the Master of Science in Electrical and Computer Engineering Leadership (MSECEL) as formal recognition of the combined focus in electrical and computer engineering technical skills and midlevel engineers' leadership acumen and broadened cross-functional capabilities. This program is offered through participation in the Gordon Engineering Leadership Program at Northeastern University and requires an additional application to the Gordon program.

Pursuing the MSECEL and the graduate certificate allows participants to:

- Enhance technical knowledge in electrical and computer engineering
- Take part in a hands-on curriculum (p. 611) taught by industry-experienced professors
- Work with peers from across engineering fields on leadership skills development
- Receive one-on-one mentoring from industry experts and faculty

The Gordon Engineering Leadership Program anchors around an intense, market-worthy challenge project based on your organization's strategic needs. This is a unique opportunity to apply your classroom experience to a professional setting, potentially further accelerating your career.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Leadership		
ENLR 5121	Engineering Leadership 1	2
ENLR 5122	Engineering Leadership 2	2
Foundations		
ENLR 5131	Scientific Foundations of Engineering 1	2
ENLR 5132	Scientific Foundations of Engineering 2	2
Project		
ENLR 7440	Engineering Leadership Challenge Project 1	4
ENLR 7442	Engineering Leadership Challenge Project 2	4
Concentration Courses		

Complete 16 semester hours from concentration courses in any of the seven EECE concentrations. Students are encouraged to take at least three courses within the same concentration.

16

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	
ENCP 6964	Co-op Work Experience	
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Mechanical and Industrial Engineering

Website (<https://mie.northeastern.edu/academics/graduate-studies/>)

Yingzi Lin, PhD

Professor and Chair

334 Snell Engineering Center

617.373.2740

617.373.2921 (fax)

Mechanical engineers design, develop, and support the manufacture of machinery and devices to transmit power or to convert energy from thermal to mechanical form in order to power the modern world and its machines. Traditionally, mechanical engineers have designed and tested devices such as heating and air-conditioning systems, machine tools, internal combustion engines, and steam power plants. Today, they also play primary roles in the development of new technologies in a variety of fields—energy conversion, solar energy utilization, environmental control, prosthetics, transportation, manufacturing, robotics, and new-materials development.

Industrial engineers design and analyze systems that include people, equipment, and materials and their interactions and performance in the workplace. An industrial engineer collects this information and evaluates alternatives to make decisions that best advance the goals of the enterprise. They leverage data analytics, artificial intelligence, machine learning, and simulation technologies to optimize complex systems and drive evidence-based decision making. Industrial engineers work in manufacturing firms, hospitals, banks, public sectors, government agencies, and service industries. They also increasingly find roles in technology companies, e-commerce platforms, and consulting firms specializing in digital transformation. Among the projects they undertake are design and implementation of a computer-integrated supply chain or manufacturing system, facilities planning for a variety of industries, design of a robotics system in a manufacturing environment, long-range corporate planning, development and implementation of a quality-control system, simulation analyses to improve processes and make operational decisions, healthcare operations design to enhance patient safety and improve efficiency, productivity, and development of computer systems for information control. Additional emerging areas include implementation of Internet of Things networks for real-time monitoring and control, development of predictive maintenance algorithms to prevent equipment failure, creation of digital twins for virtual system optimization, application of sustainable engineering principles to reduce environmental impact, design of human-AI collaborative workspaces, and utilization of Big Data analytics to identify patterns and trends that drive continuous improvement.

Mission of the Department

The mission of the Department of Mechanical and Industrial Engineering is to educate persons for professional and technical excellence; to perform research to advance the science and practice of engineering; to engage in service activities that advance the department, the university, and the profession; and to instill in ourselves and our students habits and attitudes that promote ethical behavior, professional responsibility, and careers that advance the well-being of society.

Academic Programs

The Department of Mechanical and Industrial Engineering offers comprehensive research and educational programs for both Master of Science and Doctor of Philosophy students. Our cutting-edge and vibrant doctoral programs include PhDs in industrial engineering, mechanical engineering, and an interdisciplinary engineering PhD (housed in the College of Engineering). Our MS degree programs are offered in both traditional mechanical and industrial engineering, as well as data analytics engineering, energy systems, engineering management, human factors, operations research, and advanced and intelligent manufacturing. These extensive programs and concentrations allow for the selection of a degree that meets a wide variety of personal and professional goals. Graduate students work with our world-renowned faculty to achieve research experience and their career goals and have opportunities to participate in the graduate cooperative education program.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (<https://graduate.northeastern.edu/programs/#/certificate/engineering.leadership/-/-/-/-/>).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (<https://graduate.northeastern.edu/program/graduate-certificate-in-engineering-leadership-5272/>) in combination with the MS degree.

ENGINEERING BUSINESS

Students have the opportunity to pursue the Galante Engineering Business Certificate (<https://graduate.northeastern.edu/program/galante-engineering-business-certificate-14806/>) in combination with several MS degrees.

Programs

Doctor of Philosophy (PhD)

- Industrial Engineering (Boston) (p. 614)
- Interdisciplinary Engineering (Boston) (p. 486)
- Mechanical Engineering (Boston) (p. 619)

Master of Science (MS)

- Advanced and Intelligent Manufacturing (Boston) (p. 622)
- Artificial Intelligence (Boston) (p. 164)
- Data Analytics Engineering (Boston) (p. 628)
- Data Analytics Engineering (Seattle) (p. 631)
- Data Analytics Engineering (Vancouver) (p. 634)
- Data Analytics Engineering—Online (p. 637)
- Human Factors (Boston) (p. 638)
- Robotics (Boston) (p. 180)
- Robotics (Seattle) (p. 184)
- Semiconductor Engineering (Boston) (p. 580)

Master of Science in Industrial Engineering (MSIE)

- Industrial Engineering (Boston) (p. 651)

Master of Science in Engineering Management (MSEM)

- Engineering Management (Boston) (p. 655)
- Engineering Management—Online (p. 659)

Master of Science in Energy Systems (MSEneS)

- Energy Systems (Boston) (p. 660)
- Energy Systems—Academic Link Program (Boston) (p. 663)

Master of Science in Mechanical Engineering (MSME)

- Mechanical Engineering with Concentration in General Mechanical Engineering (Boston) (p. 664)
- Mechanical Engineering with Concentration in Materials Science (Boston) (p. 667)
- Mechanical Engineering with Concentration in Mechanics and Design (Boston) (p. 669)
- Mechanical Engineering with Concentration in Mechatronics (Boston) (p. 672)
- Mechanical Engineering with Concentration in Thermofluids (Boston) (p. 675)

Master of Science in Operations Research (MSOR)

- Operations Research (Boston) (p. 677)

Graduate Certificates

- AI Applications (Boston) (p. 190)
- Data Analytics Engineering (Boston) (p. 681)
- Data Analytics Engineering (p. 681)—Online (p. 682)
- Digital Platforms for Service Innovation (Boston) (p. 682)
- Energy Systems (Boston) (p. 684)
- Energy Systems Management (Boston) (p. 684)

- Engineering Business (Boston) (p. 685)
- Engineering Economic Decision Making (Boston) (p. 687)
- Engineering Management (Boston) (p. 687)
- Lean Six Sigma (Boston) (p. 688)
- Renewable Energy (Boston) (p. 688)
- Software Engineering Systems (Boston) (p. 689)
- Supply Chain Engineering Management (Boston) (p. 689)
- Sustainable Energy Systems (Boston) (p. 690)
- Technology Systems Management (Boston) (p. 690)

Industrial Engineering, PhD (Boston)

Requirements

The PhD is awarded to students who demonstrate high academic achievement and research competence in the fields of mechanical engineering. To earn a PhD, a student must complete an approved, rigorous program of advanced coursework and submit and defend an original dissertation of independent research. The Department of Mechanical and Industrial Engineering expects all successful doctoral candidates to show depth of knowledge and research innovation in their chosen field of specialization.

The MIE department admits applicants to the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements (both written and oral components) as well as all the required coursework.

Academic and Research Advisors

PhD students must find a research advisor within their first year of study. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Students are advised by the faculty advisor of their discipline before they select their research advisor(s). The research advisor and co-advisor (if applicable) must serve on the PhD student's oral examination, dissertation proposal, and dissertation defense committees.

Change of Research Advisor

Students who wish to change their research advisor need to use the MIE petition form to make that request. The petition form must be signed by the student and by the student's current and future research advisor. The signed petition form should then be submitted to the MIE department for further processing.

Course Requirements and Plan of Study

Each doctoral student, together with their research advisor, should develop an initial program during the first semester of study. The final program is also subject to the approval of the dissertation committee, who will add the program of study to the student's record upon admission to doctoral candidacy.

DIRECT ENTRY

A typical program of study includes at least 40 semester hours of coursework beyond a bachelor's degree. Students who apply to earn a master's degree along the way to a PhD must complete a total of 52 semester hours (32 semester hours to earn a master's degree and an additional 20 semester hours in order to earn a PhD). The 32 semester hours of coursework that apply toward the master's degree may include up to 8 semester hours of thesis or 4 semester hours of project.

ADVANCED ENTRY

A typical program of study includes at least 20 semester hours of coursework beyond a master's degree.

PHD CANDIDACY

To qualify as a doctoral candidate, a doctoral student must successfully complete the doctoral qualifying requirements as well as all the required coursework.

Doctoral Qualifying Requirements

Doctoral qualifying requirements framework: The goal of the Doctoral Qualifying Examination is to: test a student's knowledge in fundamental topics; to gauge the student's potential to conduct independent research; and to provide opportunities for feedback to the student.

The Doctoral Qualifying Examination will be administered by a committee of at least three members, with a minimum of two who are full-time faculty members in the MIE department. The exam comprises both a written and an oral portion, with specifics determined by the faculty of each concentration. Complete details are provided to students in the PhD Qualifying Requirement Guidelines on the MIE department graduate website (<https://mie.northeastern.edu/academics/graduate-studies/>).

Upon successfully completing both the written and oral components in addition to all the necessary coursework, as specified by the student's concentration, the student will be designated as a PhD candidate.

Appeal Procedure

The doctoral qualifying requirements process provides means for reevaluation for students who fail one or more components to appeal the Graduate Affairs Committee decision. All communications related to these should be coordinated through the student's research advisor. Only the student's research advisor may request the MIE Graduate Affairs Committee to reevaluate the student's performance.

PhD Students Annual Review

All PhD students in the MIE department must complete the PhD Students Annual Review form with their research advisor(s) and submit any supporting documents. Annual reviews will be filed with the MIE Department of Graduate Affairs.

PhD Students Changing Their Program

PhD students who, for any reason, decide to change their degree program (i.e., from PhD in ME to PhD in IE or vice versa) must satisfy the doctoral qualifying requirements (based on the student's new major research area (i.e., industrial engineering, materials, mechanics, mechatronics, or thermofluids).

Interdisciplinary PhD Students with MIE as the Home Department

Students pursuing the College of Engineering interdisciplinary PhD program with the MIE department as their home department must satisfy the MIE doctoral qualifying requirements. Students dismissed from the ME or IE PhD programs in the MIE department cannot enroll in the PhD Interdisciplinary Engineering program with MIE as the primary affiliation.

Dissertation Proposal Preparation and Presentation Timing

Students must present their dissertation proposal no more than 18 months after successfully completing the oral exam. In addition, the presentation of the dissertation proposal and the actual dissertation defense (see below) shall be no less than 6 months apart. The student's dissertation committee will invite any additional faculty deemed appropriate to that field; this dissertation committee will then conduct the dissertation proposal session. Each student's dissertation committee must be comprised of at least three members, including the research advisor. At least two of those three members must be full-time MIE faculty members. At least three committee members should hold a PhD and at least two shall be Northeastern University faculty. The chair of the dissertation committee shall be a full-time tenured or tenure-track member of the faculty of Northeastern and will hold a PhD or an appropriate terminal degree for the discipline. Exceptions to this policy will be considered and, if appropriate, approved by the provost or their designee.

Dissertation Course Requirements

Upon successful completion of the doctoral qualifying requirements as well as all the required coursework, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters (may include full summer term) for Dissertation Term 1 (IE 9990) and Dissertation Term 2 (IE 9991). Upon completion of this sequence, the student must then register for Dissertation Continuation (IE 9996) in every semester (in each fall and spring term and also in the summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (IE 9996) until they fulfill the two-semester sequence of Dissertation Term 1 (IE 9990) and Dissertation Term 2 (IE 9991).

PhD students who have completed the majority of their coursework and not yet reached PhD candidacy should register for Candidacy Preparation—Doctoral (IE 8960), in a section for which their research or academic advisor is listed as the instructor in the online registration system.

Final Oral (Dissertation Defense) Examination

All doctoral candidates must pass a final oral exam. This exam will be scheduled once the dissertation committee agrees that the candidate's research is at a stage where it is appropriate for formal presentation and after completion of all other PhD requirements, including all the coursework approved in the final program of study. The objective of the exam is for the candidate to present and defend the results of the dissertation research and to demonstrate depth of knowledge and significant expertise in the area of that research under questioning from the dissertation committee and other attendees.

The exam shall be publicly advertised **at least one week in advance** and all faculty members may attend and participate. At the conclusion of the presentation and subsequent questions period, the dissertation committee will convene to determine the outcome. The committee may recommend that the candidate be awarded the PhD or may require additional research and/or modifications of the dissertation. In some cases, candidates may be asked to present an additional final oral dissertation defense.

Residency Requirement

After achieving PhD candidacy, the university residency requirement is satisfied by two semesters of full-time graduate registration or four semesters of part-time graduate registration. Students must be continually enrolled during the pursuit of dissertation.

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)
 Annual review
 Dissertation committee formation
 Dissertation proposal
 Dissertation defense

Core Requirements

Code	Title	Hours
Recommended Courses		
Note: Semester hours can be counted toward coursework component with advisor approval.		
MEIE 6830	Graduate Traineeship 1, Technical Writing and Communications	
MEIE 6860	Graduate Traineeship 2, Research Ethics and Professional Development	
Approved Coursework		
Requires 40 semester hours of coursework.		40

Dissertation

Code	Title	Hours
Complete the following (must register in two consecutive semesters, which may include full summer term):		
IE 9990	Dissertation Term 1	
IE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

40 total semester hours required
 Minimum 3.000 GPA required

Advanced Entry Program Requirements

Master's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)
 Annual review
 Dissertation committee formation
 Dissertation proposal
 Dissertation defense

General Requirements

Code	Title	Hours
Recommended Courses		
Semester hours can be applied toward coursework component with advisor approval.		
MEIE 6830	Graduate Traineeship 1, Technical Writing and Communications	
MEIE 6860	Graduate Traineeship 2, Research Ethics and Professional Development	
Approved Coursework		
Requires 20 semester hours of coursework. Please consult your faculty advisor for acceptable courses.		20

Dissertation Courses

Code	Title	Hours
Complete the following two courses. Must register in two consecutive semesters (may include full summer term):		
IE 9990	Dissertation Term 1	
IE 9991	Dissertation Term 2	

Program Credit/GPA Requirements

20 total semester hours required
 Minimum 3.000 GPA required

Interdisciplinary Engineering, PhD (Boston)

130 Snell Engineering Center
617.373.2711

The College of Engineering offers an interdisciplinary engineering Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. This is an individually designed program for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with their faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern University's established degree standards but need not agree exactly with the regulations of individual units. Individually designed interdisciplinary degree programs must be approved by the appropriate graduate office(s).

The interdisciplinary engineering program admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements as well as all the required coursework.

Program Requirements

In order to pursue an individually designed interdisciplinary engineering graduate program, a student must have been accepted into the interdisciplinary engineering program by an approved graduate program that will serve as the administrative home unit for the interdisciplinary engineering program:

- Department of Bioengineering (p. 470)
- Department of Chemical Engineering (p. 499)
- Department of Civil and Environmental Engineering (p. 514)
- Department of Electrical and Computer Engineering (p. 544)
- Department of Mechanical and Industrial Engineering (p. 612)

Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary engineering PhD program with the department from which they were dismissed as either home or participating department.

The interdisciplinary engineering PhD program requires a commitment from a Northeastern faculty member to serve as the student's primary faculty advisor and chair of their interdisciplinary engineering PhD committee. The primary faculty member is affiliated with the program's administrative home unit unless otherwise approved by the administrative home unit. The PhD advisory committee must be assembled within the first semester of the program, and at least two units must be represented on the committee. The committee must include at least one faculty co-advisor from all participating academic units and otherwise conforms to the rules of the home unit. This committee will be responsible for overseeing the completion of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

Supplementary Interdisciplinary Engineering PhD Program Forms

Successful application and admission to the interdisciplinary engineering PhD program requires a completed Program Preliminary Study Plan, available on the COE Graduate Student Services Forms website. This form provides a memorandum of understanding for your proposed PhD including the primary departments and advisor(s), a brief description of the planned research, and explanation of the rationale for an interdisciplinary PhD program.

No later than one year postentry into the program, a completed and signed Interdisciplinary Program Plan must be submitted to the Graduate School of Engineering. This individually designed plan includes a list of courses to be taken, a description of the qualifying and comprehensive examination process to be used, a timeline, and any other requirements of the program. This form can be found on the COE Graduate Student Services Forms website.

Qualifying Examination and Degree Candidacy

Interdisciplinary engineering PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the other department(s) involved with the student's program of study. To qualify as an interdisciplinary engineering doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required coursework.

Dissertation

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary engineering PhD students must follow the dissertation guidelines of their home department.

Residency Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. Successful completion of the total interdisciplinary engineering PhD program depends on meeting department academic milestones and academic expectations.

Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

Program Requirements

Direct Entry

Complete all requirements listed below unless otherwise indicated.

Milestones

Interdisciplinary Engineering PhD Program Preliminary Study Plan Interdisciplinary Program Plan Dissertation committee formation

- Doctoral qualifying exams (both written comprehensive and oral area exams)
- Annual review
- Dissertation proposal
- Dissertation defense

Requirements

Code	Title	Hours
A minimum of 48 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		48

Dissertation Course Requirements

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters according to their academic home unit:

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

- 48 total semester hours required
- Minimum 3.000 GPA required

Advanced Entry Program Requirements

Advanced Entry

Complete all requirements listed below unless otherwise indicated.

Milestones

Interdisciplinary Engineering PhD Program Preliminary Study Plan Interdisciplinary Program Plan Dissertation committee formation Doctoral qualifying exams (both written comprehensive and oral area exams) Annual review Dissertation proposal Dissertation defense

Requirements

Code	Title	Hours
A minimum of 20 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		20

Dissertation Course Requirements

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters according to their academic home unit:

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

Mechanical Engineering, PhD (Boston)

Requirements

The PhD is awarded to students who demonstrate high academic achievement and research competence in the fields of mechanical engineering. To earn a PhD, a student must complete an approved, rigorous program of advanced coursework and submit and defend an original dissertation of independent research. The Department of Mechanical and Industrial Engineering expects all successful doctoral candidates to show depth of knowledge and research innovation in their chosen field of specialization.

The MIE department admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements (both written and oral components) as well as all the required coursework.

Academic and Research Advisors

PhD students must find a research advisor within their first year of study. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Students are advised by the faculty advisor of their discipline before they select their research advisor(s). The research advisor and co-advisor (if applicable) must serve on the PhD student's oral examination, dissertation proposal, and dissertation defense committees.

Change of Research Advisor

Students who wish to change their research advisor need to use the MIE petition form to make that request. The petition form must be signed by the student and by the student's current and future research advisor. The signed petition form should then be submitted to the MIE department for further processing.

Course Requirements and Plan of Study

Each doctoral student, together with their research advisor, should develop an initial program during the first semester of study. The final program is also subject to the approval of the dissertation committee, who will add the program of study to the student's record upon admission to doctoral candidacy.

DIRECT ENTRY

A typical program of study includes at least 40 semester hours of coursework beyond a bachelor's degree. Students who choose to get a master's degree along the way to a PhD must complete a total of 52 semester hours (32 semester hours to earn a master's degree and an additional 20 semester hours in order to earn a PhD). The 32 semester hours of coursework that apply toward the master's degree may include up to 8 semester hours of thesis or 4 semester hours of project.

ADVANCED ENTRY

A typical program of study includes at least 20 semester hours of coursework beyond a master's degree.

PHD CANDIDACY

To qualify as a doctoral candidate, a doctoral student must successfully complete the doctoral qualifying requirements as well as all the required coursework.

Doctoral Qualifying Requirements**DOCTORAL QUALIFYING REQUIREMENTS FRAMEWORK**

The goals of the Doctoral Qualifying Examination are to test a student's knowledge in fundamental topics; to gauge the student's potential to conduct independent research; and to provide opportunities for feedback to the student.

The Doctoral Qualifying Examination will be administered by a committee of at least three members, with a minimum of two who are full-time faculty members in the MIE department. The exam comprises both a written and an oral portion, with specifics determined by the faculty of each concentration. Complete details are provided to students in the PhD Qualifying Requirement Guidelines on the MIE department graduate website (<https://mie.northeastern.edu/academics/graduate-studies/>).

Upon successfully completing both the written and oral components in addition to all the necessary coursework, as specified by the student's concentration, the student will be designated as a PhD candidate.

APPEAL PROCEDURE

The doctoral qualifying requirements process provides means for reevaluation for students who fail one or more components to appeal the Graduate Affairs Committee decision. All communications related to these should be coordinated through the student's research advisor. Only the student's research advisor may request the MIE Graduate Affairs Committee to reevaluate the student's performance.

PhD Students Annual Review

All PhD students in the MIE department must complete the PhD Students Annual Review form with their research advisor(s) and submit any supporting documents. Annual reviews will be filed with the MIE Department of Graduate Affairs.

PhD Students Changing Their Program

PhD students who, for any reason, decide to change their degree program (i.e., from PhD in ME to PhD in IE or vice versa) must satisfy the doctoral qualifying requirements (based on the student's new major research area (i.e., industrial engineering, materials, mechanics, mechatronics, or thermofluids).

Interdisciplinary PhD Students with MIE as the Home Department

Students pursuing the College of Engineering interdisciplinary PhD program with the MIE department as their home department must satisfy the MIE doctoral qualifying requirements. Students dismissed from the ME or IE PhD programs in the MIE department cannot enroll in the PhD in Interdisciplinary Engineering program with MIE as the primary affiliation.

Dissertation Proposal Preparation and Presentation Timing

Students must present their dissertation proposal no more than 18 months after successfully completing the oral exam. In addition, the presentation of the dissertation proposal and the actual dissertation defense (see below) shall be no less than 6 months apart. The student's dissertation committee will invite any additional faculty deemed appropriate to that field; this dissertation committee will then conduct the dissertation proposal session. Each student's dissertation committee must be comprised of at least three members, including the research advisor. At least two of those three members must be full-time MIE faculty members. At least three committee members should hold a PhD and at least two shall be Northeastern University faculty. The chair of the dissertation committee shall be a full-time tenured or tenure-track member of the faculty of Northeastern and will hold a PhD or an appropriate terminal degree for the discipline. Exceptions to this policy will be considered and, if appropriate, approved by the provost or their designee.

Dissertation Course Requirements

Upon successful completion of the doctoral qualifying requirements as well as all the required coursework, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters (may include full summer term) for Dissertation Term 1 (ME 9990) and Dissertation Term 2 (ME 9991). Upon completion of this sequence, the student must then register for Dissertation Continuation (ME 9996) in every semester (in each fall and spring term and also in the summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (ME 9996) until they fulfill the two-semester sequence of Dissertation Term 1 (ME 9990) and Dissertation Term 2 (ME 9991).

PhD students who have completed the majority of their coursework and not yet reached PhD candidacy should register for Candidacy Preparation—Doctoral (ME 8960), in a section for which their research or academic advisor is listed as the instructor in the online registration system.

Final Oral (Dissertation Defense) Examination

All doctoral candidates must pass a final oral exam. This exam will be scheduled once the dissertation committee agrees that the candidate's research is at a stage where it is appropriate for formal presentation and after completion of all other PhD requirements, including all the coursework approved in the final program of study. The objective of the exam is for the candidate to present and defend the results of the dissertation research and to demonstrate depth of knowledge and significant expertise in the area of that research under questioning from the dissertation committee and other attendees.

The exam shall be publicly advertised **at least one week in advance** and all faculty members may attend and participate. At the conclusion of the presentation and subsequent questions period, the dissertation committee will convene to determine the outcome. The committee may recommend that the candidate be awarded the PhD or may require additional research and/or modifications of the dissertation. In some cases, candidates may be asked to present an additional final oral dissertation defense.

Residency Requirement

After achieving PhD candidacy, the university residency requirement is satisfied by two semesters of full-time graduate registration or four semesters of part-time graduate registration. Students must be continually enrolled during the pursuit of dissertation.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)

Annual review

Dissertation committee formation

Dissertation proposal

Dissertation defense

Core Requirements

Code	Title	Hours
Recommended Courses		
Note: Semester hours can be counted toward coursework component with advisor approval.		
MEIE 6830	Graduate Traineeship 1, Technical Writing and Communications	
MEIE 6860	Graduate Traineeship 2, Research Ethics and Professional Development	

Approved Coursework

Requires 40 semester hours of coursework. Students who apply to earn an MS degree along the way to a PhD must complete a total of 52 semester hours (32 semester hours toward the sought MS degree and 20 semester hours beyond the earned MS degree). The 32 semester hours applied toward the master's degree may include up to 8 semester hours of MS Thesis or 4 semester hours of MS Project or approved independent study coursework. Please consult your faculty advisor for acceptable courses.	40

Dissertation

Code	Title	Hours
Complete the following two courses (must register in two consecutive semesters, which may include full summer term):		
ME 9990	Dissertation Term 1	
ME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)

Annual review

Dissertation committee formation

Dissertation proposal

Dissertation defense

Core Requirements

Code	Title	Hours
Recommended Courses (semester hours can be counted toward coursework component with adviser approval)		
MEIE 6830	Graduate Traineeship 1, Technical Writing and Communications	
MEIE 6860	Graduate Traineeship 2, Research Ethics and Professional Development	
Approved Course Work		
Requires 20 semester hours of coursework. Please consult your faculty advisor for acceptable courses.		20

Dissertation

Code	Title	Hours
Complete the following two courses. Must register in two consecutive semesters (may include full summer term):		
ME 9990	Dissertation Term 1	
ME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

Advanced and Intelligent Manufacturing, MS (Boston)

The Department of Mechanical and Industrial Engineering offers the Master of Science in Advanced and Intelligent Manufacturing to meet the growing demand for engineers, researchers, and scientists trained in advanced manufacturing and Industry 4.0 technologies. This degree program offers students an opportunity to either train for industry jobs with coursework and co-op experience or prepare for a doctoral program through coursework and research experience. The MIE department offers both core courses and elective courses required to complete the program. Students can take MS Project or MS Thesis under any MIE faculty. This program is designed for engineering and science students planning to pursue careers in advanced and smart manufacturing. The key sectors that require manufacturing professionals include automotive, aerospace, defense, appliances, computing machines, smartphones, and communication equipment. The MS in AIM program helps students acquire knowledge and skills to:

- Build digital (CAD) models of parts and products to support manual and computer-aided manufacturing
- Design, develop, and analyze traditional and advanced manufacturing processes
- Utilize additive manufacturing to produce complex parts with ease and efficiency
- Select manufacturing processes to fabricate parts and products for quality and cost
- Configure and analyze manufacturing systems for efficiency, responsiveness, and high throughput
- Understand the characteristics and challenges of nanomanufacturing processes
- Leverage Industry 4.0 technologies including Internet of Things, cloud computing, sensor analytics for advanced manufacturing
- Adopt condition-based maintenance strategies to achieve high resource utilization
- Apply automation, robotics, and artificial intelligence to make manufacturing smart and self-operational
- Use human-machine interaction tools such as augmented reality and virtual reality
- Analyze human performance in sociotechnical systems such as supply chains
- Apply data analytics methods to gain insights from design and manufacturing data

In the context of this program, the traditional manufacturing covers metal removal, forming, casting, and particulate processes. The additive manufacturing covers topics such as 3D-printed parts using different approaches. The nanomanufacturing covers fabrication as well as printing of micro and nano devices and design and creation of multifunctional materials. Intelligent manufacturing focuses on factory automation, prognostics and health management, dynamic scheduling, cloud-enabled manufacturing, and industrial Internet of Things for manufacturing performance assurance. It also leverages real-time data analytics and control systems, advanced high-fidelity models, networked data, and computation for seamless interoperation of cyber and physical assets in manufacturing facilities.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, statistics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Specific Degree Requirements

Core courses for the Master of Science in Advanced and Intelligent Manufacturing provide students with a foundation in traditional and advanced materials processing, additive manufacturing, intelligent manufacturing, and digital manufacturing. Students can select electives from a wide range of fields including mechanical engineering, industrial engineering, operations research, and engineering management. Alternatively, students can also take courses outside the MIE department by seeking a prior approval from their faculty advisor or MS thesis advisor. The course curriculum is designed to prepare students for industry jobs as well as for pursuing a doctoral program in manufacturing, mechanical engineering, and industrial engineering.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty in the MIE

department. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (IE 7945) or Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (coursework only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern University.

Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering are eligible to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Advanced and Intelligent Manufacturing with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Advanced and Intelligent Manufacturing in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved industrial engineering technical courses. For students who enroll in the Graduate Certificate in Engineering Leadership, 16SH of the certificate coursework may be applied to the restricted elective course (4SH) and the elective requirements of this program's coursework option (12SH).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete 16 semester hours from the following:		16
IE 5360	Digital Manufacturing	
IE 5380	Integrated Automation	
IE 6300	Manufacturing Systems Design	
IE 7270	Intelligent Manufacturing	

ME 5640	Additive Manufacturing
ME 6420	Advanced Materials and Technologies in Manufacturing

Restricted Elective Course

Code	Title	Hours
Complete 4 semester hours from the following:		4
IE 6500	Human Performance	
ME 5240	Computer Aided Design and Manufacturing	
ME 7374	Special Topics in Mechanical Engineering (Nano and Microscale Manufacturing)	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the electives course list below. (p. 624)		12

PROJECT OPTION

Code	Title	Hours
IE 7945	Master's Project	4
or ME 7945	Master's Project	
Complete 8 semester hours from the electives course list below. (p. 624)		8

THESIS OPTION

Code	Title	Hours
IE 7945	Master's Project	4
or ME 7945	Master's Project	
IE 7990	Thesis ¹	4
or ME 7990	Thesis	
Complete 4 semester hours from the electives course list below. (p. 624)		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Electives

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the faculty advisor.

Code	Title	Hours
Industrial Engineering		
IE 5617	Lean Concepts and Applications	
IE 6200	Engineering Probability and Statistics	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7270	Intelligent Manufacturing	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	

IE 7315	Human Factors Engineering
IE 7374	Special Topics in Industrial Engineering
IE 7615	Neural Networks and Deep Learning
IE 7945	Master's Project
IE 7990	Thesis
Operations Research	
OR 7230	Probabilistic Operation Research
OR 7240	Integer and Nonlinear Optimization
OR 7245	Network Analysis and Advanced Optimization
OR 7310	Logistics, Warehousing, and Scheduling
Materials Engineering	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting
MATL 6285	Structure, Properties, and Processing of Polymeric Materials
MATL 7365	Properties and Processing of Electronic Materials
Mechanical Engineering	
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5650	Advanced Mechanics of Materials
ME 5659	Control Systems Engineering
ME 7247	Advanced Control Engineering
Engineering Management	
EMGT 5220	Engineering Project Management
EMGT 6225	Economic Decision Making
EMGT 6305	Financial Management for Engineers

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

- ¹ A thesis is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship. The thesis topic should cover one or more of the areas from statistics, mathematics, optimization, data mining, machine learning, database design, Big Data, visualization tools, or forecasting methods. The thesis should train students for research in data and operations analytics and/or prepare them for a doctoral program.

Artificial Intelligence, MS (Boston)

The Master of Science in Artificial Intelligence provides a comprehensive framework encompassing foundational algorithms, theory, and practical applications in the rapidly evolving field of AI. This program offers students the essential knowledge and skills to design, develop, and implement AI systems across various high-demand sectors. The core curriculum is designed to provide in-depth understanding of fundamental AI concepts, forming a solid foundation for both theoretical and practical aspects of artificial intelligence.

Building on this strong foundation, students can delve into advanced AI applications through interdisciplinary concentrations tailored to industry needs. These concentrations include computer vision, continuous process engineering, machine learning, and robotics and agent-based systems.

The master's in artificial intelligence is an interdisciplinary degree offered by Khoury College of Computer Sciences and the College of Engineering. Descriptions of the concentrations offered in this degree are as follows:

- Computer Vision—College of Engineering
 - The computer vision concentration offers students the knowledge and skills to drive innovation at the intersection of new and emerging vision systems and AI, through utilizing AI and machine learning solutions for a wide range of applications including image enhancement/restoration, object recognition, navigation, graphics rendering, and pattern classification.
- Continuous Process Engineering—College of Engineering
 - The continuous process engineering concentration offers students the knowledge and skills to revolutionize how industrial processes are designed, monitored, and optimized. The program aims to prepare students to utilize AI and machine learning solutions to enhance process

efficiency, predictive maintenance, and real-time decision making in industries such as chemicals, pharmaceuticals, and energy. Graduates will be prepared to integrate AI-driven solutions into continuous manufacturing environments to improve safety, sustainability, and productivity.

- Energy Systems—College of Engineering

- The energy systems concentration offers students the knowledge and skills to drive innovation in sustainable and intelligent energy systems. Students examine how to utilize AI and machine learning solutions to support smart energy grid operations, integrate renewable energy sources, and create responsive and resilient systems.

- Machine Learning—Khoury College of Computer Sciences

- The goal of the machine learning concentration is to provide students with practical, hands-on experience in designing, implementing, and optimizing machine learning models for real-world applications. The curriculum positions graduates to pursue roles that leverage AI to drive innovation and efficiency in a wide variety of industries and domains.

- Robotics and Agent-Based Systems—Khoury College of Computer Sciences

- The goal of the robotics and agent-based systems concentration is to provide students with expertise in designing and developing intelligent robotic systems and autonomous agents capable of performing complex tasks in dynamic environments. The curriculum positions graduates to pursue roles that contribute to innovations in automation, human-robot interaction, and intelligent systems design.

Students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their college of admission.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following:

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 5130	Applied Programming and Data Processing for AI	4
DADS 5200	Mathematics for Machine Learning	4
or DS 5020	Introduction to Linear Algebra and Probability for Data Science	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	4
or DADS 7275	Machine Learning and Data Analytics	

Concentrations

Complete one of the following concentrations:

- Computer Vision (p. 165)—College of Engineering
- Continuous Process Engineering (p. 165)—College of Engineering
- Energy Systems (p. 165)—College of Engineering
- Machine Learning (p. 166)—Khoury College of Computer Sciences
- Robotics and Agent-Based Systems (p. 166)—Khoury College of Computer Sciences

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

COMPUTER VISION CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Complete 8 semester hours from the following:		8
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
or ME 5554	Robotics Sensing and Navigation	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5639	Computer Vision	

EECE 5642	Data Visualization	
Complete 4 semester hours from the following:		4
EECE 5645	Parallel Processing for Data Analytics	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering	
Capstone		
EECE 7945	Master's Project	4

CONTINUOUS PROCESS ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Students without a chemical engineering degree are advised to choose the 510X courses, which serve as a bridge from other degrees.		
Complete 8 semester hours from the following:		8
CHME 5101 and CHME 5102	Fundamentals of Chemical Engineering: Fluid, Heat, and Mass Transfer and Fundamentals of Chemical Engineering: Thermodynamics and Kinetics	
CHME 5510 and CHME 5515	Fundamentals in Process Safety Engineering and Process Safety Engineering for Biotechnology and Pharmaceutical Industries	
CHME 7600 and CHME 7601	Pharmaceutical Engineering I and Pharmaceutical Engineering II	
Complete 4 semester hours from the following:		4
CHEM 5641 and CHME 7901	Computational Chemistry and Journal Club in Chemical Engineering	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5520	Designing for Process Safety	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
IE 7270	Intelligent Manufacturing	
PHIL 5010	AI Ethics	
PHSC 5900	AI in Drug Discovery and Development	
Capstone		
CHME 6580	Artificial Intelligence for Process Engineering Capstone	4

ENERGY SYSTEMS CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Complete 12 semester hours from the following:		12
CHME 5621	Electrochemical Engineering	
CHME 5692	Carbon Capture, Utilization, and Storage	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5700	Renewable Energy Development	
ENSY 5800	Applications of Artificial Intelligence in Energy Systems	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5374	Special Topics in Mechanical Engineering	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
PHIL 5010	AI Ethics	
Capstone		
ME 7945	Master's Project	4

MACHINE LEARNING CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
CS 5800	Algorithms	4
Complete 8 semester hours from the following:		8
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	

CS 7140	Advanced Machine Learning
CS 7150	Deep Learning
CS 7180	Special Topics in Artificial Intelligence

Capstone

Complete 4 semester hours from the following: 4

CS 6170	AI Capstone
CS 8674	Master's Project

ROBOTICS AND AGENT-BASED SYSTEMS CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
CS 5800	Algorithms	4

Complete 8 semester hours from the following: 8

CS 5180	Reinforcement Learning and Sequential Decision Making
CS 5335	Robotic Science and Systems
EECE 5550	Mobile Robotics
EECE 5554	Robotics Sensing and Navigation

Capstone

Complete 4 semester hours from the following: 4

CS 6170	AI Capstone
CS 8674	Master's Project

Data Analytics Engineering, MS (Boston)

For program contact information, please visit this website (https://mie.northeastern.edu/academics/graduate-studies/ms-daae/#_ga=28171695117827619191584316293-4047061391578954920).

The Department of Mechanical and Industrial Engineering offers the Master of Science in Data Analytics Engineering to meet the current and projected workforce demands. This degree program offers students an opportunity to train for industry jobs or to acquire rigorous analytical skills and research experience to prepare for a doctoral program in health, security, and sustainability at Northeastern University. While the core courses for this program are offered by the College of Engineering, students can choose elective courses from diverse disciplines spread across various colleges at Northeastern. The MS degree in data analytics engineering is designed to train students with engineering, science, mathematics, and statistics backgrounds as advanced data analytics professionals and researchers who can transform large streams of data into understandable and actionable information for the purpose of making decisions. The key sectors that require analytics professionals include healthcare, smart manufacturing, supply chain and logistics, national security, defense, banking, finance, marketing, human resources, and sports.

The Master of Science in Data Analytics Engineering program helps students acquire knowledge and skills to:

- Discover opportunities to improve products, processes, systems, and enterprises through data analytics
- Apply optimization, statistical, and machine-learning methods to solve complex problems involving large data from multiple sources
- Process and explore data from a variety of sources, including Internet of Things, an integrated network of devices and sensors, customer touch points, processes, social media, and people
- Work with technology teams to design and build large and complex SQL and NoSQL databases
- Use tools and methods for data mining, Big Data processing, and data visualization to generate reports for analysis and decision making
- Create integrated views of data collected from multiple sources of an enterprise
- Understand and explain results of data analytics to decision makers
- Design and develop data analytics projects

This degree program seeks to prepare students for a comprehensive list of tasks including collecting, storing, processing, and analyzing data; reporting descriptive statistics and patterns; performing diagnostic, predictive, and prescriptive analytics; drawing conclusions and insights; making actionable recommendations; and designing and managing data analytics projects.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, statistics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can

be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Specific Degree Requirements

Core courses for the Master of Science in Data Analytics Engineering provide students with a foundation in algorithms and optimization, statistics, data and knowledge engineering, data mining, and visualization. These courses are designed to provide students with a strong understanding of probability and statistics, statistical learning, optimization methods, data mining, database design, and visualization. Students can select electives from a wide range of fields including business, finance, engineering, healthcare, manufacturing, and urban communities/cities. Elective courses provide students with the knowledge and understanding of descriptive, prescriptive, diagnostic, and predictive analytics as applied to a specific field of interest such as business, healthcare, manufacturing, and urban communities/cities. Alternatively, students can select their electives so that they can prepare for a doctoral program by taking advanced courses in mathematics, statistics, machine learning, natural language processing, and pattern recognition.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty in the MIE department. However, if the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose the project option by taking Master's Project (IE 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (Coursework Only, Project, or Thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering are eligible to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 770). Please note that students pursuing the Master of Science in Data Analytics Engineering are not eligible for the Graduate Certificate in Data Analytics Engineering.

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Data Analytics Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Data Analytics Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program (<https://galante.sites.northeastern.edu/>) in order

to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 semester hours of advisor-approved data analytics technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 12SH of the certificate coursework may be applied to the core requirement and 4SH of the certificate coursework may be applied to the elective requirement of this program's coursework, project or thesis option.

GALANTE ENGINEERING BUSINESS PROGRAM

Master's Degree in Data Analytics Engineering with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Data Analytics Engineering in addition to earning a Graduate Certificate in Engineering Business (p. 685). Students must apply and be admitted to the Galante Engineering Business Program (<http://galante.sites.northeastern.edu/>) in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University or another accredited university/college within the U.S. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the data analytics engineering core courses and 16 semester hours from the outlined business-skill curriculum. The coursework, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements ¹

Code	Title	Hours
IE 6400	Foundations for Data Analytics Engineering	4
IE 6600	Computation and Visualization for Analytics	4
IE 6700	Data Management for Analytics	4
IE 7275	Data Mining in Engineering	4
IE 7615	Neural Networks and Deep Learning	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the elective course list below. (p. 630)		12

PROJECT OPTION

Code	Title	Hours
IE 7945	Master's Project	4
Complete 8 semester hours from the elective course list below. (p. 630)		8

THESIS OPTION ²

Code	Title	Hours
IE 7945	Master's Project	4
IE 7990	Thesis	4
Complete 4 semester hours from the elective course list below. (p. 630)		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Elective Course List

An elective can be any course from the following subject codes that is offered on the Boston campus and for which the student satisfies prerequisites and program requirements.

Code	Title	Hours
Complete courses from any of the following subject codes:		
BINF		
BIOE		
CHME		
CIVE		
CS (except CS 5800 and CS 6140)		
DS		
EECE		
EMGT		
ENGR		
ENSY		
GE		
IE		
INFO		
HINF		
MATH		
MATL		
MEIE		
ME		
OR		
SBSY		

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

- ¹ Core courses cannot be substituted.
- ² A thesis is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship. The thesis topic should cover one or more of the areas from statistics, mathematics, optimization, data mining, machine learning, database design, Big Data, visualization tools, or forecasting methods. The thesis should train students for research in data and operations analytics and/or prepare them for a doctoral program.

Data Analytics Engineering, MS (Seattle)

For program contact information, please visit this website (https://mie.northeastern.edu/academics/graduate-studies/ms-daae/#_ga=28171695117827619191584316293-4047061391578954920).

The Department of Mechanical and Industrial Engineering offers the Master of Science in Data Analytics Engineering to meet the current and projected workforce demands. This degree program offers students an opportunity to train for industry jobs or to acquire rigorous analytical skills and research experience to prepare for a doctoral program in health, security, and sustainability at Northeastern University. While the core courses for this program are offered by the College of Engineering, students can choose elective courses from diverse disciplines spread across various colleges at Northeastern. The MS degree in data analytics engineering is designed to train students with engineering, science, mathematics, and statistics backgrounds as advanced data analytics professionals and researchers who can transform large streams of data into understandable and actionable information for the purpose of making decisions. The key sectors that require analytics professionals include healthcare, smart manufacturing, supply chain and logistics, national security, defense, banking, finance, marketing, human resources, and sports.

The Master of Science in Data Analytics Engineering program helps students acquire knowledge and skills to:

- Discover opportunities to improve products, processes, systems, and enterprises through data analytics
- Apply optimization, statistical, and machine-learning methods to solve complex problems involving large data from multiple sources
- Process and explore data from a variety of sources, including Internet of Things, an integrated network of devices and sensors, customer touch points, processes, social media, and people
- Work with technology teams to design and build large and complex SQL and NoSQL databases
- Use tools and methods for data mining, Big Data processing, and data visualization to generate reports for analysis and decision making
- Create integrated views of data collected from multiple sources of an enterprise

- Understand and explain results of data analytics to decision makers
- Design and develop data analytics projects

This degree program seeks to prepare students for a comprehensive list of tasks including collecting, storing, processing, and analyzing data; reporting descriptive statistics and patterns; performing diagnostic, predictive, and prescriptive analytics; drawing conclusions and insights; making actionable recommendations; and designing and managing data analytics projects.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, statistics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the two tracks: project option and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Specific Degree Requirements

Core courses for the Master of Science in Data Analytics Engineering provide students with a foundation in algorithms and optimization, statistics, data and knowledge engineering, data mining, and visualization. These courses are designed to provide students with a strong understanding of probability and statistics, statistical learning, optimization methods, data mining, database design, and visualization. Students can select electives from a wide range of fields including business, finance, engineering, healthcare, manufacturing, and urban communities/cities. Elective courses provide students with the knowledge and understanding of descriptive, prescriptive, diagnostic, and predictive analytics as applied to a specific field of interest such as business, healthcare, manufacturing, and urban communities/cities. Alternatively, students can select their electives so that they can prepare for a doctoral program by taking advanced courses in mathematics, statistics, machine learning, natural language processing, and pattern recognition.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty in the MIE department. However, if the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their program before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose the project option by taking Master's Project (IE 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (Project or Thesis)

Students accepted into this program can choose one of two options: project or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program

Students enrolled in any of the MIE department programs may change their current program no sooner than the beginning of their second full-time semester of study. In order for the program change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the

first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 6400	Foundations for Data Analytics Engineering	4
IE 6600	Computation and Visualization for Analytics	4
IE 6700	Data Management for Analytics	4
or DAMG 6210	Data Management and Database Design	
IE 7275	Data Mining in Engineering	4
OR 6205	Deterministic Operations Research	4
or CS 5800	Algorithms	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the elective course list below. (p. 633)		12

PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project	4
Complete 8 semester hours from the elective course list below.* (p. 633)		8

THESIS OPTION ¹

Code	Title	Hours
IE 7945	Master's Project	4
IE 7990	Thesis	4
Complete 4 semester hours from the elective course list below. (p. 633)		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Elective Course List

Code	Title	Hours
Any course in the following list will serve as an elective course, provided the course is offered and the student satisfied prerequisites and program requirements.		
IE 5374	Special Topics in Industrial Engineering	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5630	Biosensor and Human Behavior Measurement	

IE 6300	Manufacturing Systems Design
IE 7200	Supply Chain Engineering
IE 7215	Simulation Analysis
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
IE 7290	Reliability Analysis and Risk Assessment
IE 7300	Statistical Learning for Engineering
IE 7374	Special Topics in Industrial Engineering
IE 7500	Applied Natural Language Processing in Engineering
OR 6205	Deterministic Operations Research
OR 7230	Probabilistic Operation Research
OR 7235	Inventory Theory
OR 7240	Integer and Nonlinear Optimization
OR 7245	Network Analysis and Advanced Optimization
OR 7310	Logistics, Warehousing, and Scheduling

Data Analytics Engineering, MS (Vancouver)

For program contact information, please visit this website (<https://mie.northeastern.edu/academics/graduate-studies/ms-daae/>).

The Department of Mechanical and Industrial Engineering offers the Master of Science in Data Analytics Engineering to meet the current and projected workforce demands. This degree program offers students an opportunity to train for industry jobs or to acquire rigorous analytical skills and research experience to prepare for a doctoral program in health, security, and sustainability at Northeastern University. While the core courses for this program are offered by the College of Engineering, students can choose elective courses from diverse disciplines spread across various colleges at Northeastern. The MS degree in data analytics engineering is designed to train students with engineering, science, mathematics, and statistics backgrounds as advanced data analytics professionals and researchers who can transform large streams of data into understandable and actionable information for the purpose of making decisions. The key sectors that require analytics professionals include healthcare, smart manufacturing, supply chain and logistics, national security, defense, banking, finance, marketing, human resources, and sports.

The Master of Science in Data Analytics Engineering program helps students acquire knowledge and skills to:

- Discover opportunities to improve products, processes, systems, and enterprises through data analytics
- Apply optimization, statistical, and machine-learning methods to solve complex problems involving large data from multiple sources
- Process and explore data from a variety of sources, including Internet of Things, an integrated network of devices and sensors, customer touch points, processes, social media, and people
- Work with technology teams to design and build large and complex SQL and NoSQL databases
- Use tools and methods for data mining, Big Data processing, and data visualization to generate reports for analysis and decision making
- Create integrated views of data collected from multiple sources of an enterprise
- Understand and explain results of data analytics to decision makers
- Design and develop data analytics projects

This degree program seeks to prepare students for a comprehensive list of tasks including collecting, storing, processing, and analyzing data; reporting descriptive statistics and patterns; performing diagnostic, predictive, and prescriptive analytics; drawing conclusions and insights; making actionable recommendations; and designing and managing data analytics projects.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, statistics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the two tracks: project option and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Specific Degree Requirements

Core courses for the Master of Science in Data Analytics Engineering provide students with a foundation in algorithms and optimization, statistics, data and knowledge engineering, data mining, and visualization. These courses are designed to provide students with a strong understanding of probability and statistics, statistical learning, optimization methods, data mining, database design, and visualization. Students can select electives from a wide range of fields including business, finance, engineering, healthcare, manufacturing, and urban communities/cities. Elective courses provide students with the knowledge and understanding of descriptive, prescriptive, diagnostic, and predictive analytics as applied to a specific field of interest such as business, healthcare, manufacturing, and urban communities/cities. Alternatively, students can select their electives so that they

can prepare for a doctoral program by taking advanced courses in mathematics, statistics, machine learning, natural language processing, and pattern recognition.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty in the MIE department. However, if the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their program before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose the project option by taking Master's Project (IE 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (Project or Thesis)

Students accepted into this program can choose one of two options: project or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program

Students enrolled in any of the MIE department programs may change their current program no sooner than the beginning of their second full-time semester of study. In order for the program change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 6400	Foundations for Data Analytics Engineering	4
IE 6600	Computation and Visualization for Analytics	4
IE 6700	Data Management for Analytics	4
IE 7275	Data Mining in Engineering	4
IE 7615	Neural Networks and Deep Learning	4

Options

Complete one of the following options:

PROJECT OPTION

Code	Title	Hours
IE 7945	Master's Project	4
Complete 8 semester hours from the elective course list below. (p. 636)		8

THESIS OPTION ¹

Code	Title	Hours
Complete the following course twice:		8
IE 7990	Thesis	
Complete 4 semester hours from the elective course list below. (p. 636)		4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Elective Course List

Any course in the following list will serve as an elective course, provided the course is offered and the student satisfied prerequisites and program requirements.

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5330	Pattern Recognition and Computer Vision	
CS 6240	Large-Scale Parallel Data Processing	
CS 6620	Fundamentals of Cloud Computing	
CS 7240	Principles of Scalable Data Management: Theory, Algorithms, and Database Systems	
DAMG 7245	Big-Data Systems and Intelligence Analytics	
DAMG 7250	Big Data Architecture and Governance	
EECE 5645	Parallel Processing for Data Analytics	
EECE 7205	Fundamentals of Computer Engineering	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
IE 5137	Computational Modeling in Industrial Engineering	
IE 5200	Mathematics for Machine Learning	
IE 5374	Special Topics in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5630	Biosensor and Human Behavior Measurement	
IE 5640	Data Mining for Engineering Applications	
IE 6300	Manufacturing Systems Design	
IE 6750	Data Warehousing and Integration	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7295	Applied Reinforcement Learning in Engineering	
IE 7300	Statistical Learning for Engineering	
IE 7374	Special Topics in Industrial Engineering	

IE 7500	Applied Natural Language Processing in Engineering
INFO 6215	Business Analysis and Information Engineering
INFO 7260	Business Process Engineering
ME 6200	Mathematical Methods for Mechanical Engineers 1
OR 6205	Deterministic Operations Research
OR 7230	Probabilistic Operation Research
OR 7235	Inventory Theory
OR 7240	Integer and Nonlinear Optimization
OR 7245	Network Analysis and Advanced Optimization
OR 7310	Logistics, Warehousing, and Scheduling

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

- ¹ A thesis is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship. The thesis topic should cover one or more of the areas from statistics, mathematics, optimization, data mining, machine learning, database design, Big Data, visualization tools, or forecasting methods. The thesis should train students for research in data and operations analytics and/or prepare them for a doctoral program.

Data Analytics Engineering, MS—Online

Prepare for a career on the frontier of data analytics, with the Online Master of Science in Data Analytics Engineering. Whether you're an experienced engineer or brand-new to data analytics, this program will immerse you in specializations such as data visualization, database design, and data mining, giving you the opportunity to obtain the skills to bridge the gap between raw data and actionable insights.

Once you've mastered essential data analytics techniques such as data normalization and data mapping—and become proficient in multiple programming languages such as R, SQL, and Python—you'll be ready to take on roles like predictive modeling analyst, advanced software engineer, data integration engineer, and more to help shape the evolution of data as a transformative force in modern society.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 6400 or DADS 6400	Foundations for Data Analytics Engineering Foundations for Data Analytics	4
IE 6600 or DADS 6600	Computation and Visualization for Analytics Computation and Visualization for Analytics	4
IE 6700 or DADS 6700	Data Management for Analytics Data Management for Analytics	4
IE 7275 or DADS 7275	Data Mining in Engineering Machine Learning and Data Analytics	4
IE 7615	Neural Networks and Deep Learning	4

Additional Requirements

Code	Title	Hours
Complete 12 semester hours from the following:		12
IE 6750	Data Warehousing and Integration	
IE 7300	Statistical Learning for Engineering	
IE 7500	Applied Natural Language Processing in Engineering	
OR 6205	Deterministic Operations Research	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Human Factors, MS (Boston)

Website (<https://mie.northeastern.edu/academics/graduate-studies/ms-hf/>)

This program addresses the growing need for engineering professionals trained in advanced human factors who can utilize human factors theories, procedures, and empirically derived knowledge into understandable and actionable information for use in the design and evaluation of a wide variety of products and systems. The key sectors demanding human factors professionals include transportation, healthcare, robotics, manufacturing, computer, consumer products, social, and organizational and military issues. The core courses of the Master of Science in Human Factors program are built on the foundations of human factors and ergonomics, probabilities and statistics, etc. Topics from these foundation areas are integrated to create human factors for engineering applications. Students can select their elective or breadth courses from a wide range of fields. The program seeks to prepare students for a comprehensive set of human-factors-related professional positions.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework, but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students may also petition to substitute a different course for a core course by demonstrating evidence of their having passed a similar approved IE or OR graduate course. In such situations, the students must first obtain approval from their academic advisor for the course(s) they are planning to substitute.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (IE 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (Coursework Only, Project, or Thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option (16 semester hours).

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate

Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Human Factors with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Human Factors in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved human factors technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 16 semester hours of the certificate coursework may be applied to the elective requirements of this program's coursework option.

GALANTE ENGINEERING BUSINESS PROGRAM

Master's Degree in Human Factors with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Human Factors in addition to earning a Graduate Certificate in Engineering Business (p. 685). Students must apply and be admitted to the Galante Engineering Business Program (<http://galante.sites.northeastern.edu/>) in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University or another accredited university/college within the United States. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the human factors core courses and 16 semester hours from the outlined business-skill curriculum.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 6200	Engineering Probability and Statistics	4
IE 6500	Human Performance	4
IE 7280	Statistical Methods in Engineering	4
IE 7315	Human Factors Engineering	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the course list below. (p. 640)		16

PROJECT OPTION

Code	Title	Hours
IE 7945	Master's Project	4
Complete 12 semester hours from the course list below. (p. 640)		12

THESIS OPTION ¹

Code	Title	Hours
IE 7945	Master's Project	4
IE 7990	Thesis	4
Complete 8 semester hours from the course list below. (p. 640)		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0

or ENCP 6954	Co-op Work Experience - Half-Time
or ENCP 6955	Co-op Work Experience Abroad - Half-Time
or ENCP 6965	Co-op Work Experience Abroad

Course List

Code	Title	Hours

Any course in the following list will fulfill the coursework option, provided the student satisfies prerequisites and program requirements. Students can take courses outside this list with prior approval from the faculty advisor.

College of Engineering

EMGT 5300	Engineering/Organizational Psychology
EMGT 6305	Financial Management for Engineers
EMGT 6600	Engineering Team Performance
GE 5010	Customer-Driven Technical Innovation for Engineers
GE 5020	Engineering Product Design Methodology
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
IE 5137	Computational Modeling in Industrial Engineering
IE 5390	Structured Data Analytics for Industrial Engineering
IE 5630	Biosensor and Human Behavior Measurement
IE 5640	Data Mining for Engineering Applications
IE 6600	Computation and Visualization for Analytics

The following courses are available to students who concurrently enroll in the Graduate Certificate in Engineering Leadership:

ENLR 5121	Engineering Leadership 1
ENLR 5122	Engineering Leadership 2
ENLR 5131	Scientific Foundations of Engineering 1
ENLR 5132	Scientific Foundations of Engineering 2
ENLR 7440	Engineering Leadership Challenge Project 1
ENLR 7442	Engineering Leadership Challenge Project 2

College of Social Sciences and Humanities

ECON 7200	Topics in Applied Economics
ECON 7251	International Finance

College of Science

PSYC 5180	Quantitative Methods 1
PSYC 5181	Quantitative Methods 2
PSYC 7300	Advanced Quantitative Analysis
PSYC 7301	Research Methodologies Psychology

Bouvé College of Health Sciences

EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing
EXSC 5220	Advanced Exercise Physiology

Khoury College of Computer Sciences

CS 5340	Computer/Human Interaction
CS 6350	Empirical Research Methods

College of Arts, Media and Design

ARTG 5150	Information Visualization Principles and Practices
ARTG 5310	Visual Cognition
ARTG 5330	Visualization Technologies 1: Fundamentals
ARTG 5600	Experience Design Studio 1: Principles
ARTG 5610	Design Systems
ARTG 5640	Prototyping for Experience Design

Design Research Methods

ARTG 6310	Design for Behavior and Experience
GSND 6240	Exploratory Concept Design
GSND 6250	Spatial and Temporal Design

GSND 6330

Player Experience

GSND 6340

Biometrics of Design

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

- ¹ Thesis option is required for all students who receive financial support from Northeastern University in the form of a research, teaching, or tuition assistantship.

Robotics, MS (Boston)

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics offers instruction by the faculty of the College of Engineering, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences. The program is designed to provide students with comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Biomedical and Rehabilitation Robotics—College of Engineering
- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

Gordon Institute of Engineering Leadership

Master's Degree in Robotics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Robotics in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved robotics technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 8 semester hours of the certificate coursework may be applied to this program's elective requirements in the coursework option.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Electrical and Computer Engineering		
Complete one of the following:		4
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Computer Science		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

Concentrations

Complete one of the following options:

- Biomedical and Rehabilitation Robotics (p. 181)—College of Engineering
- Computer Science (p. 182)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 182)—College of Engineering
- Mechanical Engineering (p. 183)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required (33 total semester hours with participation in co-op in certain concentrations)

Minimum 3.000 GPA required

BIOMEDICAL AND REHABILITATION ROBOTICS CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
Complete one of the following:		4
BIOE 5520	Bioengineering Design for Robotic Rehabilitation	
PT 5170 and PT 5171	Motor Control and Lab for PT 5170	
PT 5321	Applications of Biomechanics in Human Function and Movement	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 183)		
<i>Project Option</i>		
Students working with Department of Physical Therapy, Movement, and Rehabilitation Sciences faculty should enroll in the PT course. Students working with Department of Bioengineering faculty should choose the BIOE course.		
BIOE 7945	Master's Project	
or PT 7995	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p. 183)		
<i>Thesis Option</i>		
Students working with Department of Physical Therapy, Movement, and Rehabilitation Sciences faculty should enroll in the PT course. Students working with Department of Bioengineering faculty should choose the BIOE course.		
BIOE 7945	Master's Project	
or PT 7995	Master's Project	
BIOE 7990	Thesis	
or PT 7990	Thesis	
Complete 8 semester hours of courses from the elective course list. (p. 183)		
Optional Co-op		
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.		
Required Course		
Complete one additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
Options		
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 183)		
<i>Project Option</i>		

CS 8674	Master's Project
Complete 12 semester hours of courses from the elective course list. (p. 183)	
<i>Thesis Option</i>	
CS 7990	Thesis
CS 8674	Master's Project
Complete 8 semester hours of courses from the elective course list. (p. 183)	

Optional Co-op

For students in the this concentration, please consult your academic advisor for co-op procedures.

ELECTRICAL AND COMPUTER ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours

Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional EECE course not used to fulfill the core requirements: 4

EECE 5550	Mobile Robotics
EECE 5552	Assistive Robotics
EECE 5554	Robotics Sensing and Navigation

Options

Complete one of the following options: 16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

EECE 7945	Master's Project

Complete 12 semester hours of courses from the elective course list. (p. 183)

Thesis Option

EECE 7945	Master's Project

EECE 7990	Thesis

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

Complete the following (students must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

MECHANICAL ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours

Students in the mechanical engineering concentration follow the College of Engineering co-op policies.

Required Course

Complete one additional ME course not used to fulfill the core requirements: 4

ME 5250	Robot Mechanics and Control
ME 5659	Control Systems Engineering

Options

Complete one of the following options: 16

Coursework Option

Complete 16 semester hours of courses from the elective course list. (p. 183)

Project Option

ME 7945	Master's Project

Complete 12 semester hours of courses from the elective course list. (p. 183)

Thesis Option

ME 7945	Master's Project

ME 7990

Thesis

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Complete 8 semester hours of courses from the elective course list. (p. 183)

Optional Co-op

Complete the following (students must complete ENCP 6100 to qualify for co-op experience):

ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Elective Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)	
IE 6500	Human Performance	
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	
IE 7615	Neural Networks and Deep Learning	
ME 5240	Computer Aided Design and Manufacturing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5654	Elasticity and Plasticity	
ME 5655	Dynamics and Mechanical Vibration	
ME 5659	Control Systems Engineering	

ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6250	Wearable Robotics
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7247	Advanced Control Engineering
PT 5170	Motor Control
PT 5321	Applications of Biomechanics in Human Function and Movement
PT 7001	Core Concepts in Rehabilitation Science and Research
PT 7005	Experimental Design and Applied Statistics
PT 7020	Technologies in Movement and Rehabilitation Science

Robotics, MS (Seattle)

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics is offered by the College of Engineering and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mechanical Engineering		
Complete one of the following:		4
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
Electrical and Computer Engineering		
Complete one of the following:		4
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Computer Science		
Complete one of the following:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	

Concentrations

Complete one of the following concentrations:

- Computer Science (p. 185)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 185)—College of Engineering
- Mechanical Engineering (p. 186)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required (33 total semester hours with participation in co-op in certain concentrations)

Minimum 3.000 GPA required

CONCENTRATION IN COMPUTER SCIENCE

Code	Title	Hours
Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.		
Required Course		
Complete one additional CS course not used to fulfill the core requirements:		4
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p.)		
<i>Project Option</i>		
CS 8674	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p.)		
<i>Thesis Option</i>		
CS 8674	Master's Project	
CS 7990	Thesis	
Complete 8 semester hours of courses from the elective course list. (p.)		
Optional Co-op		
For students in the this concentration, please consult your academic advisor for co-op procedures.		

CONCENTRATION IN ELECTRICAL AND COMPUTER ENGINEERING

Code	Title	Hours
Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.		
Required Course		
Complete one additional EECE course not used to fulfill the core requirements:		4
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p.)		
<i>Project Option</i>		
EECE 7945	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p.)		
<i>Thesis Option</i>		
EECE 7945	Master's Project	
EECE 7990	Thesis	
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
Complete 8 semester hours of courses from the elective course list. (p.)		
Optional Co-op		
Complete the following (students in EECE and MIE concentrations must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

CONCENTRATION IN MECHANICAL ENGINEERING

Code	Title	Hours
Students in the mechanical engineering concentration follow the College of Engineering co-op policies.		
Required Course		
Complete one additional ME course not used to fulfill the core requirements:		4
ME 5250	Robot Mechanics and Control	

ME 5659	Control Systems Engineering	
Complete one of the following options:		16
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p.)		
<i>Project Option</i>		
ME 7945	Master's Project	
Complete 12 semester hours of courses from the elective course list. (p.)		
<i>Thesis Option</i>		
ME 7945	Master's Project	
ME 7990	Thesis	
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
Complete 8 semester hours of courses from the elective course list. (p.)		
Optional Co-op		
Complete the following (students in EECE and MIE concentrations must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Elective Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
DS 5220	Supervised Machine Learning and Learning Theory	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)	
IE 6500	Human Performance	
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	

IE 7615	Neural Networks and Deep Learning
ME 5240	Computer Aided Design and Manufacturing
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7247	Advanced Control Engineering

Semiconductor Engineering, MS (Boston)

The Master of Science in Semiconductor Engineering, offered by the Institute for NanoSystems Innovation—along with the Department of Electrical and Computer Engineering, the Department of Mechanical and Industrial Engineering, and the Department of Chemical Engineering in the College of Engineering—and the D'Amore-McKim School of Business, is designed to meet the burgeoning demand for skilled professionals in the semiconductor industry. This cutting-edge program aims to equip students with the knowledge and skills necessary to excel in this rapidly evolving field.

The national landscape is witnessing a significant uptick in interest in expanding the talent pool within the semiconductor sector, particularly following the enactment of the U.S. CHIPS and Science Act of 2022. This pivotal legislation has catalyzed a marked increase in the demand for engineers, drawing considerable attention from a wide array of companies to the semiconductor industry. There is a need for skilled workers to build new plants to increase and localize manufacturing capacity, design chips, and the tools that make the chips. This program is strategically positioned to address this growing need, offering a comprehensive educational experience that prepares our graduates to lead and innovate in this critical domain.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
NanoSystems		
Complete one of the following:		4
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7244 or ME 6260	Introduction to Microelectromechanical Systems (MEMS) Introduction to Microelectromechanical Systems (MEMS)	
Manufacturing		
Complete one of the following:		4
EECE 5606	Micro- and Nanofabrication	
MATL 7365	Properties and Processing of Electronic Materials	
ME 5630	Nano- and Microscale Manufacturing	
Innovation		
Complete four semester hours from the following. Students may not meet this requirement solely with directed study coursework:		4
BUSN 6379	Entrepreneurial Ecosystems	
BUSN 6389	Leading Global Virtual Innovation Teams	
CHME 5976	Directed Study	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
INNO 6200	Enterprise Growth and Innovation	
ME 5976	Directed Study	

Concentrations

Complete one of the following concentrations:

- Devices and NanoSystems (p. 581)
- Materials and Manufacturing (p. 581)

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

CONCENTRATION IN DEVICES AND NANOSYSTEMS

Code	Title	Hours
Complete two of the following not used to complete other requirements of this program:		8
EECE 5606	Micro- and Nanofabrication	
EECE 5651	Introduction to Photonic Devices	
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7244 or ME 6260	Introduction to Microelectromechanical Systems (MEMS) Introduction to Microelectromechanical Systems (MEMS)	
EECE 7250	Power Management Integrated Circuits	
EECE 7353	VLSI Design	
Complete one of the following options for 12 semester hours:		12
<i>Coursework Option</i>		
Complete 12 semester hours from the restricted electives course list. (p. 582)		
<i>Project Option</i>		
EECE 7945	Master's Project	
Complete 8 semester hours from the restricted electives course list. (p. 582)		
<i>Thesis Option</i>		
EECE 7945	Master's Project	
EECE 7990	Thesis	
Complete 4 semester hours from the restricted electives course list. (p. 582)		

CONCENTRATION IN MATERIALS AND MANUFACTURING

Code	Title	Hours
Complete two of the following not used to complete other requirements of this program:		8
CHME 5105	Materials Characterization Techniques	
IE 6200	Engineering Probability and Statistics	
IE 7270	Intelligent Manufacturing	
MATL 7365	Properties and Processing of Electronic Materials	
ME 5245	Mechatronic Systems	
ME 5620	Fundamentals of Advanced Materials	
ME 5630	Nano- and Microscale Manufacturing	
Complete one of the following options for 12 semester hours:		12
<i>Coursework Option</i>		
Complete 12 semester hours from the restricted electives course list. (p. 582)		
<i>Project Option</i>		
ME 7945	Master's Project	

or CHME 7945	Master's Project
or IE 7945	Master's Project

Complete 8 semester hours from the restricted electives course list. (p. 582)

Thesis Option

ME 7945	Master's Project
or CHME 7945	Master's Project
or IE 7945	Master's Project

ME 7990	Thesis
or CHME 7990	Thesis
or IE 7990	Thesis

Complete 4 semester hours from the restricted electives course list. (p. 582)

Restricted Electives Course List

Any course in the following elective lists will fulfill the restricted elective requirement, provided the course has not already been applied to fulfill core requirements of this program and provided the student satisfies prerequisites. Students can take electives outside of these lists with prior approval from the faculty advisor.

Code	Title	Hours
Elective Courses in Engineering and Science		
CHME 5105	Materials Characterization Techniques	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5621	Electrochemical Engineering	
CHME 5642 and CHME 5643	Photochemistry Fundamentals and Applications and Photochemistry Lab	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering (BioMEM Systems)	
CHME 5699	Special Topics in Chemical Engineering (Carbon Capture Storage and Utilization)	
CHME 7340	Chemical Engineering Kinetics	
EECE 5606	Micro- and Nanofabrication	
EECE 5608	Magnetic Materials for Next-Generation Electronics	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5651	Introduction to Photonic Devices	
EECE 5652	Microwave Circuits and Systems	
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Quantum Engineering)	
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7244 or ME 6260	Introduction to Microelectromechanical Systems (MEMS) Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7247	Radio Frequency Integrated Circuit Design	
EECE 7250	Power Management Integrated Circuits	
EECE 7296	Electronic Materials	
EECE 7353	VLSI Design	
EECE 7368	High-Level Design of Hardware-Software Systems	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Tech)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Low Power Integrated Circuits Design)	
IE 5617	Lean Concepts and Applications	

IE 5137	Computational Modeling in Industrial Engineering
IE 6200	Engineering Probability and Statistics
IE 6300	Manufacturing Systems Design
IE 6700	Data Management for Analytics
IE 7200	Supply Chain Engineering
IE 7270	Intelligent Manufacturing
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
IE 7290	Reliability Analysis and Risk Assessment
MATL 6250	Soft Matter
MATL 6290	Fundamentals of Nanostructured Materials
MATL 7365	Properties and Processing of Electronic Materials
ME 5240	Computer Aided Design and Manufacturing
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5520	Fundamentals and Applications of Optics and Photonics
ME 5600	Materials Processing and Process Selection
ME 5620	Fundamentals of Advanced Materials
ME 5630	Nano- and Microscale Manufacturing
ME 5640	Additive Manufacturing
PHYS 5114	Physics and Applications of Quantum Materials
PHYS 5125	Advanced Quantum Mechanics
PHYS 5260	Introduction to Nanoscience and Nanotechnology
PHYS 5318	Principles of Experimental Physics
PHYS 5352	Quantum Computation and Information

Elective Courses in Innovation

A maximum of 4 semester hours may be taken from the following:

FINA 6309	Foundations of Accounting and Finance
GE 5010	Customer-Driven Technical Innovation for Engineers
GE 5020	Engineering Product Design Methodology
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
HRMG 6200	Managing People and Organizations
HRMG 6230	Leading a Diverse and Inclusive Organization
HRMG 6280	The Human Side of Innovation
INNO 6200	Enterprise Growth and Innovation
MGMT 6213	Managing Ethics in the Workplace and Marketplace
MGMT 6225	Sustainability and Leadership
MGMT 6226	Sustainability and the Business Environment
MKTG 6200	Creating and Sustaining Customer Markets

FINA, HRMG, INNO, MGMT, and MKTG courses listed above are 3 semester hours, so students may take one additional 1 semester hour of courses from the list below for a total of 4 semester hours:

BUSN 6379	Entrepreneurial Ecosystems
BUSN 6389	Leading Global Virtual Innovation Teams
CHME 5976	Directed Study
ME 5976	Directed Study

Industrial Engineering, MSIE (Boston)

Website (<https://mie.northeastern.edu/academics/graduate-studies/ms-inde/>)

The Department of Mechanical and Industrial Engineering offers comprehensive research and educational programs for students pursuing the Master of Science in Industrial Engineering. Industrial engineering applies mathematical modeling and analytical tools to make better decisions for designing and managing efficient and effective systems. IE is applied in many areas, including healthcare systems, supply chains, logistics and transportation engineering, manufacturing, sustainability, resilient systems, energy systems, and human-in-the loop systems. We partner with organizations ranging

from startups to well-established corporations, to government and nongovernment organizations. For example, our supply chain resilience research is trying to understand and mitigate persistent drug shortages in the United States. Our research in healthcare systems engineering uses methods from lean Six Sigma tools to advanced mathematical models to improve system and product reliability and optimize healthcare process quality, delays, cost, efficiency, and effectiveness—national priorities. Recent healthcare applications include improvements in scheduling, readmissions, cost reductions, cancer care, and health services planning. We use stochastic and simulation modeling to study environmental issues related to green manufacturing, product recovery, and end-of-life management. We use data analytics for designing prognostics and preventive strategies for manufacturing operations. Our research and teaching together are designed to develop IE practitioners who can work, innovate, and excel in a variety of businesses. These extensive programs and coursework allow for the selection of a degree that meets a wide variety of personal and professional goals.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students may also petition to waive a core course by demonstrating evidence of their having passed a similar approved IE or OR graduate course. In such situations, the students must first obtain approval from their academic advisor for the course(s) they are planning to substitute.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (IE 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (coursework only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from Northeastern University in the form of a research, teaching, or tuition assistantship must complete the thesis option (16 semester hours). Students are strongly encouraged to complete 4 semester hours of Master's Project (IE 7945) followed by 4 semester hours of Thesis (IE 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Industrial Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Industrial Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved industrial engineering technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 16 semester hours of the certificate coursework may be applied to the elective requirements of this program's coursework option.

GALANTE ENGINEERING BUSINESS PROGRAM

Master's Degree in Industrial Engineering with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Industrial Engineering in addition to earning a Graduate Certificate in Engineering Business (<https://catalog.northeastern.edu/graduate/engineering/mechanical-industrial/engineering-business-graduate-certificate/>). Students must apply and be admitted to the Galante Engineering Business Program (<http://galante.sites.northeastern.edu/>) in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern or another accredited university/college within the U.S. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the industrial engineering core courses and 16 semester hours from the outlined business-skill curriculum. The coursework, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business. (<https://mie.northeastern.edu/academics/graduate-studies/cert-enbu/>)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4
Complete 8 semester hours from the following:		8
IE 5400 or IE 5500 or IE 7350	Healthcare Systems Modeling and Analysis Systems Engineering in Public Programs Sociotechnical Systems: Computational Models for Design and Policy	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7275	Data Mining in Engineering	
IE 7315 or IE 6500	Human Factors Engineering Human Performance	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the course list below.		16

PROJECT OPTION

Code	Title	Hours
IE 7945	Master's Project	4
Complete 12 semester hours from the course list below.		12

THESIS OPTION ¹

Code	Title	Hours
IE 7945	Master's Project	4
IE 7990	Thesis	4
Complete 8 semester hours from the course list below.		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the faculty advisor.

Code	Title	Hours
Computer Systems Engineering		
CSYE 7280	User Experience Design and Testing	
Data Analytics		
DA 5020	Collecting, Storing, and Retrieving Data	
Data Architecture Management		
DAMG 6210	Data Management and Database Design	
Engineering Management		
EMGT 5220	Engineering Project Management	
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
General Engineering		
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
Industrial Engineering		
IE 5137	Computational Modeling in Industrial Engineering	
IE 5617	Lean Concepts and Applications	
IE 6300	Manufacturing Systems Design	
IE 6400	Foundations for Data Analytics Engineering	
IE 6600	Computation and Visualization for Analytics	
IE 6700	Data Management for Analytics	
IE 7270	Intelligent Manufacturing	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7295	Applied Reinforcement Learning in Engineering	
IE 7300	Statistical Learning for Engineering	
IE 7315	Human Factors Engineering	
IE 7350	Sociotechnical Systems: Computational Models for Design and Policy	
Operations Research		
OR 6500	Metaheuristics and Applications	
OR 7230	Probabilistic Operation Research	
OR 7235	Inventory Theory	
OR 7240	Integer and Nonlinear Optimization	
OR 7245	Network Analysis and Advanced Optimization	
OR 7270	Convex Optimization and Applications	
OR 7310	Logistics, Warehousing, and Scheduling	
Supply Chain Management		
SCHM 6213	Global Supply Chain Strategy	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	

Or any IE or OR courses

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

- ¹ Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

Engineering Management, MSEM (Boston)

The Master of Science in Engineering Management (<https://mie.northeastern.edu/academics/graduate-studies/ms-engm/>) offers graduate students an opportunity to develop both technical expertise and business competence that is in high demand among prospective technology-based employers. Industry leaders are seeking qualified and talented individuals who are not only able to guide research and design teams but also able to direct and supervise development and production processes. The combination of technical proficiency and business skills fostered in the engineering management program is designed to provide a competitive edge for graduates seeking a wide range of positions in technology-based product or service industries, as well as in comparable local, state, and federal agencies and programs.

The program was designed by experienced high-level managers and academic leaders as an option for engineers and scientists to broaden their skill sets to include management tools and techniques that are applicable to technology-based industries. Graduates of the engineering management program work as project managers or leaders of teams in technology-based industries. Upon completion of the program, students find that their acquired skills are applicable to a wide range of industries, primarily those focused upon the development of technical products and the management of technical projects.

Graduates may assist companies in bringing a product from an idea through its development phases to its introduction to the marketplace. They may also be involved in forming and managing teams for assessing cost-effectiveness, formulating strategies to improve production, or analyzing a company's supply chain. Most of these projects cannot be successfully completed without the skills of those possessing a background in management decision making and engineering expertise; therefore, the engineering management graduate is often a technical liaison to all levels of management. As a result, many of the assignments held by engineering management graduates have actually proven to be a gateway to upper-level management positions.

The current program of study can be taken on a part-time or full-time basis on-ground or online. There are four core courses required of all students, which have been formulated to satisfy the foundation requirements of economic decision making, decision-making mathematics, and project management. In addition to these required courses, the curriculum consists of electives that allow students to choose either a broad-based program of study or one centered on a particular concentration. Some students may elect to refresh or enhance their technical skills in engineering-based subjects such as information systems, computer systems engineering, or graduate courses from the traditional engineering disciplines. Other students may prefer to broaden their knowledge base by selecting coursework in management subjects such as engineering organizational psychology, financial management, logistics and warehousing, supply chain engineering, or lean systems design. Additionally, students may also elect to complete the Gordon Engineering Leadership Program as part of their engineering management degree.

One recent graduate has observed that "Northeastern's MSEM is like an MBA for engineers, with high-quality, dedicated professors who are proficient in their field yet are able to convey information in a way that's easy to understand." This graduate also noted, "My courses in project management have been key to understanding the subtleties that affect Project Managers while technical courses provide a strong background in fundamentals as well as specialty topics. My experience with co-op has been outstanding and has truly helped me further my career."

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework, but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (EMGT 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (Coursework Only, Project, or Thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option. Students are strongly encouraged to complete 4 semester hours of Master's Project (EMGT 7945) followed by 4 semester hours of Thesis (EMGT 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Engineering Management with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Engineering Management in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved engineering management technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 16SH of the certificate coursework may be applied to the elective requirements of this program's coursework option.

GALANTE ENGINEERING BUSINESS PROGRAM

Master's Degree in Engineering Management with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Engineering Management in addition to earning a Graduate Certificate in Engineering Business (p. 685). Students must apply and be admitted to the Galante Engineering Business Program (<http://galante.sites.northeastern.edu/>) in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University or another accredited university/college within the U.S. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the engineering management core courses and 16 semester hours from the outlined business-skill curriculum. The coursework,

along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business. (<https://mie.northeastern.edu/academics/graduate-studies/cert-enbu/>)

Program Requirements

Core Requirements

Complete all courses and requirements listed below unless otherwise indicated. Students may not register for more than 9 semester hours in the fall, spring, and summer terms.

Code	Title	Hours
Required Courses		
EMGT 5220	Engineering Project Management	4
EMGT 6225	Economic Decision Making	4
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 8 semester hours from the course list below. (p. 658)		8

PROJECT OPTION

Code	Title	Hours
EMGT 7945	Master's Project	4
Complete 4 semester hours from the course list below. (p. 658)		4

THESIS OPTION ¹

Code	Title	Hours
EMGT 7945	Master's Project	4
EMGT 7990	Thesis	4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

ONLINE OPTION

Code	Title	Hours
Complete 8 semester hours from the course list below. (p. 658)		8
Courses offered online can be found on the online course list below. (p. 659)		

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Concentration or Electives Option

A concentration is not required. Students may complete electives in lieu of a concentration.

- Digital Product Management (p. 658)
- Electives (p. 658) Option (p. 658)

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)
Minimum 3.000 GPA required

¹ Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

DIGITAL PRODUCT MANAGEMENT CONCENTRATION

Code	Title	Hours
EMGT 6700	Digital Product Design and Management	4
EMGT 6750	Advanced Product Management	4

ELECTIVES OPTION

Code	Title	Hours
Complete 8 semester hours from the course list below, not used to fulfil other requirements of the program. (p. 658)		8

ELECTIVE COURSE LIST

Code	Title	Hours
CSYE 7280	User Experience Design and Testing	
DAMG 6210	Data Management and Database Design	
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6305	Financial Management for Engineers	
EMGT 6600	Engineering Team Performance	
EMGT 6700	Digital Product Design and Management	
ENGR 6010	Fundamentals of the Platform Economy	
ENSY 5000	Fundamentals of Energy System Integration	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5020	Engineering Product Design Methodology	
GE 5030	Iterative Product Prototyping for Engineers	
GE 5100	Product Development for Engineers	
IE 5137	Computational Modeling in Industrial Engineering	
IE 5374	Special Topics in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5500	Systems Engineering in Public Programs	
IE 5617 and IE 5618	Lean Concepts and Applications and Recitation for IE 5617	
IE 5640	Data Mining for Engineering Applications	
IE 6300	Manufacturing Systems Design	
IE 6500	Human Performance	
IE 6600	Computation and Visualization for Analytics	
IE 6962	Elective	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7270	Intelligent Manufacturing	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7315	Human Factors Engineering	
IE 7374	Special Topics in Industrial Engineering	
IE 7615	Neural Networks and Deep Learning	
INFO 6215	Business Analysis and Information Engineering	
INFO 7245	Agile Software Development	
INFO 7285	Organizational Change and IT	
INFO 7385	Managerial Communications for Engineers	
ME 6200	Mathematical Methods for Mechanical Engineers 1	

OR 6500	Metaheuristics and Applications
OR 6962	Elective
OR 7230	Probabilistic Operation Research
OR 7240	Integer and Nonlinear Optimization
OR 7245	Network Analysis and Advanced Optimization
OR 7270	Convex Optimization and Applications
OR 7310	Logistics, Warehousing, and Scheduling
OR 7374	Special Topics in Operations Research
TELE 5330	Data Networking
or any EMGT, IE, or OR courses	

Electives Outside the College of Engineering

A maximum of 9 semester hours may be taken from the following toward the elective requirement:

DA 5020	Collecting, Storing, and Retrieving Data
ENTR 6212	Business Planning for New Ventures
ENTR 6218	Business Model Design and Innovation
ENTR 6240	Emerging and Disruptive Technologies
ENTR 6241	Entrepreneurial Marketing and Selling
ENTR 6250	Lean Design and Development
ENTR 6300	Managing a Technology-Based Business
ENTR 6340	The Technical Entrepreneur as Leader
INNO 6200	Enterprise Growth and Innovation
SCHM 6211	Logistics and Transportation Management
SCHM 6213	Global Supply Chain Strategy
SCHM 6214	Sourcing and Procurement
SCHM 6215	Supply Chain Analytics
SCHM 6221	Sustainability and Supply Chain Management
SCHM 6223	Managing Healthcare Supply Chain Operations
SCHM 6224	Demand Planning and Forecasting

Online Course List

Code	Title	Hours
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6305	Financial Management for Engineers	
ENSY 5000	Fundamentals of Energy System Integration	
IE 5640	Data Mining for Engineering Applications	
IE 6300	Manufacturing Systems Design	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7315	Human Factors Engineering	
INFO 6215	Business Analysis and Information Engineering	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
OR 7230	Probabilistic Operation Research	
OR 7240	Integer and Nonlinear Optimization	
OR 7310	Logistics, Warehousing, and Scheduling	

Engineering Management, MSEM—Online

The Online Master of Science in Engineering Management offers graduate students an opportunity to develop both technical expertise and management and business competence highly sought after by technology-driven employers. Whether you are planning to change your career path or start a career in technical management, this program provides you with the right skills. The blend of technical proficiency and management skills

fostered in this program is designed to prepare graduate students to excel across a wide range of careers in technology-driven industries as well as government organizations.

The program offers students instruction in how to assist companies in taking products from conception to market. They may play a crucial role in forming and managing teams for assessing cost-effectiveness, designing strategies to improve production, or analyzing supply chains. Most of these projects require an integrated set of skills that require managerial decision making on the one hand and engineering expertise on the other. This skill set enables graduates of this program to serve as technical liaisons within different levels of the organization, often paving the way to senior management roles.

The program curriculum includes four core courses required of all students, designed to establish the essential foundations in economic decision making, quantitative decision modeling, and project management. In addition to these core courses, students can tailor their studies through a wide range of electives, allowing them to pursue either a broad-based path or a more specialized plan of study. For instance, some students may elect to refresh or enhance their technical skills in engineering-based courses such as data analytics and information systems, while others may prefer to broaden their knowledge base by selecting coursework in management subjects such as organizational leadership, financial management, supply chain, lean design, or strategic planning.

Program Requirements

Complete all the core requirements listed below unless otherwise indicated.

Code	Title	Hours
Core Requirements		
EMGT 5220	Engineering Project Management	4
EMGT 6225	Economic Decision Making	4
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4
Electives		
Complete 16 semester hours of elective coursework.		16
<i>Recommended Electives</i>		
EEBA 6406	Managing Operational Disruption in Healthcare	
ENTR 6250	Lean Design and Development	
FINA 6318	Financial Management	
HRMG 6318	Managing the Organization	
IE 6400	Foundations for Data Analytics Engineering	
IE 6600	Computation and Visualization for Analytics	
IE 6700	Data Management for Analytics	
INFO 6245	Planning and Managing Information Systems Development	
INFO 7245	Agile Software Development	
INFO 7260	Business Process Engineering	
SCHM 6318	Managing Operations and the Supply Chain	
STRT 6318	Strategic Planning for the Future	
<i>Other Elective Options</i>		
Any INFO course in range 5000–7999		
Any IE course in range 5000–7999		

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Energy Systems, MSeNeS (Boston)

The Master of Science in Energy Systems (<https://mie.northeastern.edu/academics/graduate-studies/ms-enes/>) integrates engineering, business, and policy into a high-level signature, multidisciplinary graduate program. Energy systems students have an opportunity to learn how to leverage business skills and public policy knowledge to accomplish their engineering goals. This program is ideal for the engineer or technical business major who is interested in pursuing an industrial or public-planning-based career.

The program's mission is to educate students in current and future energy systems technologies, to integrate energy-related technologies with the economics and financial considerations required to implement them, and to develop leadership and decision-making skills to implement energy systems in either the private or public sectors of the global market. The program will expose students to a combination of academic and corporate experience in energy systems.

The program curriculum features a multidisciplinary range of electives from five different academic colleges at Northeastern University. The curriculum is flexibly designed with a set of four core courses in engineering knowledge and finance in addition to four electives. The core courses help relate these electives back to energy-related engineering concepts including power strategies, energy renewal, sustainable energy solutions, energy storage, energy conversion, and energy efficiency. By integrating concepts across these disciplines, our students learn that implementing energy solutions requires an economic solution as well as an engineering one.

Students are exposed to business educators and practicing professionals and have the opportunity to participate in a six-month co-op experience. Practicing professionals with experience in the industry who have successfully implemented energy systems or devices and policies are actively involved in the program as adjunct professors and invited speakers. Through this curriculum and interaction with practitioners, students should be prepared to effectively integrate energy system development over a broad spectrum of technologies with the financial requirements to successfully implement them and to compete in the global energy market.

Successful graduates of the program will be involved in the decision making or policy planning that will deliver minimally polluting, energy-efficient systems to the global market. They will have the base training necessary to lead efforts within companies to plan and implement new energy-generation investments, realize energy-efficiency improvements specifically at the system level, and participate in energy and environmental markets such as cap-and-trade systems.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework, but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ENSY 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Energy Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Energy Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved energy systems technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 12 semester hours of the certificate coursework may be applied to the elective requirements of this program's coursework option.

Program Requirements

Core Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
Required Courses		
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4
or FINA 6309	Foundations of Accounting and Finance	
ENSY 5000	Fundamentals of Energy System Integration	4
ENSY 5700	Renewable Energy Development	4

Restricted Electives

Code	Title	Hours
Complete a minimum of 8 semester hours from the following:		8
CHME 5621	Electrochemical Engineering	
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5400	Power Plant Design and Analysis	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ENSY 5650	Geologic Energy Systems for Energy Generation and Carbon Sequestration	
ENSY 5800	Applications of Artificial Intelligence in Energy Systems	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5685	Solar Thermal Engineering	
ME 6200	Mathematical Methods for Mechanical Engineers 1	

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Other Electives

Code	Title	Hours
An additional 8 semester hours can either be taken from the list above or from the following list below or by approval of program director.		
CHEM 5614	Electroanalytical Chemistry	
CHEM 5651	Materials Chemistry of Renewable Energy	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
EECE 5680	Electric Drives	
EECE 5682	Power Systems Analysis 1	
EECE 5684	Power Electronics	
EMGT 5220	Engineering Project Management	
ENSY 7945	Master's Project	
ME 5690	Gas Turbine Combustion	
ME 7270	General Thermodynamics	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
SBSY 5200	Sustainable Engineering Systems for Buildings	

Online Course List

All required courses and many electives are offered as online courses.

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)
Minimum 3.000 GPA required

Energy Systems, MSeNeS—Academic Link (Boston)

For program contact information, please visit the College of Engineering website (<https://mie.northeastern.edu/academics/graduate-studies/mse-nes/>).

Designing and implementing optimal methods to produce and utilize energy is one of the most pressing global issues today. Finding ways to implement these solutions that are sustainable and marketable is key. The energy systems Academic Link (AL) program is meant to provide engineering students who have not had any exposure to thermal sciences with the foundation skills necessary to create and implement energy solutions. Students begin the program by taking two core courses that cover topics across thermal sciences and math along with the general energy systems curriculum.

The preparatory core courses introduce students to the fundamentals that are necessary to be successful in the energy system program. AL courses are integrated with our multidisciplinary energy system curriculum that integrates engineering, business, and policy. Our curriculum is flexibly designed with a set of core courses in engineering and finance complemented by a range of electives across five different academic colleges. Our core and elective courses are designed to help to prepare students to lead the efforts to implement energy systems solutions that have a long-term positive effect on businesses and communities.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Energy Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Energy Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 44-semester-hour degree and certificate will require 28 hours of advisor-approved energy systems technical [courses](#). For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 4 semester hours of the certificate coursework may be applied to the Restricted Electives requirements and 8 semester hours may be applied to the Other Electives requirements of this program.

Program Requirements

General Requirements

A minimum of 40 semester hours must be earned toward completion of the degree. A minimum grade-point average of 3.000 is required over all courses applied toward the degree.

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete 20 semester hours from the following:		20
EMGT 6225	Economic Decision Making	
ENSY 5050	Fundamentals of Thermal Science 1	
ENSY 5060	Fundamentals of Thermal Science 2	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5700	Renewable Energy Development	
Complete 4 semester hours from the following:		4
EMGT 6305	Financial Management for Engineers	
FINA 6309	Foundations of Accounting and Finance	

Restricted Electives List

Code	Title	Hours
Complete a minimum of 8 semester hours from the following:		8
CHME 5621	Electrochemical Engineering	
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	

ENSY 5300	Electrochemical Energy Storage
ENSY 5400	Power Plant Design and Analysis
ENSY 5500	Smart Grid
ENSY 5585	Wind Energy Systems
ENSY 5650	Geologic Energy Systems for Energy Generation and Carbon Sequestration
ENSY 5800	Applications of Artificial Intelligence in Energy Systems
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting
ME 5685	Solar Thermal Engineering
ME 6200	Mathematical Methods for Mechanical Engineers 1

Other Electives List

Code	Title	Hours
An additional 8 semester hours can either be taken from the list above or from the list below or by approval of the program director:		8

CHEM 5614	Electroanalytical Chemistry
CHEM 5651	Materials Chemistry of Renewable Energy
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
EECE 5680	Electric Drives
EECE 5682	Power Systems Analysis 1
EECE 5684	Power Electronics
EMGT 5220	Engineering Project Management
ENSY 7440	Energy Systems Engineering Leadership Challenge Project 1
ENSY 7442	Energy Systems Engineering Leadership Challenge Project 2
ENSY 7945	Master's Project
ME 5690	Gas Turbine Combustion
ME 7270	General Thermodynamics
ME 7300	Combustion and Air Pollution
ME 7305	Fundamentals of Combustion
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change
SBSY 5200	Sustainable Engineering Systems for Buildings

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Online Course List

All required courses and many electives are offered as online courses.

Program Credit/GPA Requirements

40 total semester hours required (41 with optional co-op)

Minimum 3.000 GPA required

Mechanical Engineering with Concentration in General Mechanical Engineering, MSME (Boston)

Overview

While pursuing a Master of Science in Mechanical Engineering (<https://mie.northeastern.edu/academics/graduate-studies/ms-mece/>), students may choose the general mechanical engineering concentration.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved

coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (Coursework Only, Project, or Thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option (16 semester hours).

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Mechanical Engineering with Concentration in General Mechanical Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Mechanical Engineering with Concentration in General Mechanical Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved mechanical engineering technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 16 semester hours of the certificate coursework may be applied to the elective requirements of this program's coursework option.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mathematics Competency		
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
Thermofluids Competency		
Complete 4 semester hours from the following:		4
ME 5685	Solar Thermal Engineering	
ME 5690	Gas Turbine Combustion	
ME 5695	Aerodynamics	
ME 7295	Multiscale Flow and Transport Phenomena	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
ME 7310	Computational Fluid Dynamics with Heat Transfer	
Mechanics/Mechatronics Combined Competency		
Complete 4 semester hours from the following:		4
EECE 5610	Digital Control Systems	
EECE 5666	Digital Signal Processing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5650	Advanced Mechanics of Materials	
ME 5654	Elasticity and Plasticity	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method 1	
ME 5659	Control Systems Engineering	
ME 7238	Finite Element Method 2	
Materials Competency		
Complete 4 semester hours from the following:		4
MATL 6250	Soft Matter	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
MATL 6285	Structure, Properties, and Processing of Polymeric Materials	
ME 5600	Materials Processing and Process Selection	
ME 5620	Fundamentals of Advanced Materials	
or any MATL courses		

OPTIONS

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours in the following subject areas:		16
ME, MATL		

PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project	4

Electives

Complete 12 semester hours in the following subject areas:		12
ME, MATL		

THESIS OPTION ¹

Code	Title	Hours
ME 7945	Master's Project	4
ME 7990	Thesis	4

Electives

Complete 8 semester hours in the following subject areas:		8
ME, MATL		

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

- ¹ Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

Mechanical Engineering with Concentration in Materials Science, MSME (Boston)

For program contact information, please visit this website (<https://mie.northeastern.edu/academics/graduate-studies/ms-mece/>).

Overview

While pursuing a Master of Science in Mechanical Engineering, students may choose materials science as a concentration. Materials science has been the key enabler in virtually all engineering breakthroughs that have occurred from early metal ages to the present nano age. In step with the scientific development and discovery of materials, members of the mechanical and industrial engineering faculty are involved in interdisciplinary research to further materials processing, synthesis, and design. Research areas are aligned with Northeastern University's broad initiatives of sustainability, security, and health, as well as national initiatives in manufacturing and nanotechnology. Investigations in the areas of metals/alloys, polymers, biomaterials (including biomimetics), and composites incorporating nanoscale materials make use of experimental, theoretical, and computational techniques to tailor structure-processing-property relationships in materials for specific applications. Current areas of research include controlling synthesis and assembly processes to produce well-defined atomic structures; defect engineering; manipulating atomic/microstructures and the chemistry of materials to optimize properties for next-generation structural, electronic, and energy applications; solidification and deformation processing, nanomanufacturing; and life-cycle assessments for nanocomposites/materials. Northeastern faculty and students are committed to creative thinking and engineering innovation to propel materials development to the forefront of scientific research.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it

also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (Coursework Only, Project, or Thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option (16 semester hours).

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Mechanical Engineering with Concentration in Materials Science with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Mechanical Engineering with Concentration in Materials Science in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved materials science technical courses. For students who concurrently enroll in the Graduate Certificate for Engineering Leadership, 16 semester hours of the certificate coursework may be applied to the elective requirements of this program's coursework option.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete 16 semester hours from the following:		16
MATL 6250	Soft Matter	
MATL 6285	Structure, Properties, and Processing of Polymeric Materials	
MATL 7355	Thermodynamics of Materials	
ME 5600	Materials Processing and Process Selection	
ME 5620	Fundamentals of Advanced Materials	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Electives		
Complete 16 semester hours in the following subject areas:		16
ME, MATL		

PROJECT OPTION

Code	Title	Hours
MATL 7945	Master's Project	4
Electives		
Complete 12 semester hours in the following subject areas:		12
ME, MATL		

THESIS OPTION ¹

Code	Title	Hours
ME 7945	Master's Project	4
ME 7990	Thesis	4
Electives		
Complete 8 semester hours in the following subject areas:		8
ME, MATL		

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

¹ Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

Mechanical Engineering with Concentration in Mechanics and Design, MSME (Boston)**Overview**

While pursuing a Master of Science in Mechanical Engineering with Concentration in Mechanics and Design (<https://mie.northeastern.edu/academics/graduate-studies/ms-mece/>), the students will study the motion, deformation, and failure of solid materials in response to the action of direct forces and external fields. The students will also get a chance to conduct research with faculty and observe how these studies will lead to key engineering innovations and designs. Using complementary analytical, computational, experimental, and design tools, the M&D faculty members conduct research in the design and analysis of engineered functional materials/structures, in mechanics of adhesion and contact, and in biomechanics and mechanobiology. For example, in our biomechanics research, we strive to close the gap between function, form, and disease in the bone by using experimental and computational techniques; also, we explore the mechanics of lipid-based drug delivery vesicles. At the small length scales, we are creating a new understanding of nanomechanics, contact mechanics, tribology, MEMS, and the application of nanomaterials for energy storage systems. Our research and teaching together are designed to prepare students to understand and exploit mechanics to enable their future engineering innovations.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (Coursework Only, Project, or Thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option (16 semester hours).

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Mechanical Engineering with a Concentration in Mechanics and Design with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Mechanical Engineering with Concentration in Mechanics and Design in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 semester hours of advisor-approved mechanics and design technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 16 semester hours of the certificate coursework may be applied to the elective requirements of this program's coursework option.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mathematics Competency		
ME 6200	Mathematical Methods for Mechanical Engineers 1	4

Mechanics Competency

Complete 12 semester hours from the following:		12
ME 5650	Advanced Mechanics of Materials	
ME 5654	Elasticity and Plasticity	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method 1	
ME 5659	Control Systems Engineering	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the course list. (p. 671)		16

PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project	4
Complete 12 semester hours from the course list. (p. 671)		12

THESIS OPTION ¹

Code	Title	Hours
ME 7945	Master's Project	4
ME 7990	Thesis	4
Complete 8 semester hours from the course list. (p. 671)		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

¹ Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

Course List

Code	Title	Hours
Any course in the following list will fulfill the coursework option, provided the student satisfies prerequisites and program requirements (students can take courses outside this list with prior approval from the faculty advisor):		
ME 5240	Computer Aided Design and Manufacturing	
ME 5374	Special Topics in Mechanical Engineering (Fracture Mechanics and Adhesion in Biological Science)	
ME 5374	Special Topics in Mechanical Engineering (Inelasticity)	
ME 5658	Continuum Mechanics	
ME 5665	Musculoskeletal Biomechanics	
ME 6260	Introduction to Microelectromechanical Systems (MEMS)	
ME 7238	Finite Element Method 2	

Mechanical Engineering with Concentration in Mechatronics, MSME (Boston)

While pursuing a Master of Science in Mechanical Engineering (<https://mie.northeastern.edu/academics/graduate-studies/ms-mece/>), students may choose mechatronics as a concentration. The term mechatronics is a combination of the words mechanics and electronics. Mechatronics is a multidisciplinary approach to product design and development, merging the principles of electrical, mechanical, computer, material, chemical, and industrial engineering. The mechatronics and systems research cluster in the MIE department is concerned with systems that are typically composed of traditional mechanical and electrical components but are rendered “intelligent” by the incorporation of sensors, actuators, and computer control systems. Our primary focus in mechatronics and systems is on intelligent and integrated systems and machines along with their practical applications ranging from manufacturing systems and robotic platforms to biological systems. Our research and teaching together are designed to prepare students to understand and exploit mechatronics to enable their future engineering innovations.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (Coursework Only, Project, or Thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option (12 semester hours).

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate

Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Mechanical Engineering with Concentration in Mechatronics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Mechanical Engineering with Concentration in Mechatronics in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved mechatronics technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 12 semester hours of the certificate coursework may be applied to the elective requirements of this program's coursework option.

GALANTE ENGINEERING BUSINESS PROGRAM

Master's Degree in Mechanical Engineering with Concentration In Mechatronics with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Mechanical Engineering with Concentration in Mechatronics in addition to earning a Graduate Certificate in Engineering Business (p. 685). Students must apply and be admitted to both the mechatronics concentration and the Galante Engineering Business Program (<http://galante.sites.northeastern.edu/>) in order to pursue this option. The Galante Engineering Business Program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern or another accredited university/college within the United States. The integrated 32-semester-hour degree and certificate will require 16 semester hours of core courses from the mechatronics concentration and 16 semester hours from a specific set of applicable elective graduate-level mechanical engineering courses. Students should consult the program directors of the mechatronics concentration and the Galante Engineering Business Program prior to selecting courses. The coursework, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business (p. 685).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Mathematics Competency		
ME 6200 or IE 6200	Mathematical Methods for Mechanical Engineers 1 Engineering Probability and Statistics	
Mechanics Competency		
Complete 4 semester hours from the following:		4
ME 5250	Robot Mechanics and Control	
ME 5650	Advanced Mechanics of Materials	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method 1	
Mechatronics Concentration		
ME 5245	Mechatronic Systems	4
ME 5659	Control Systems Engineering ¹	4
Electrical Competency		
Complete 4 semester hours from the following:		4
EECE 5610	Digital Control Systems	
EECE 5666	Digital Signal Processing	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
ME 6260	Introduction to Microelectromechanical Systems (MEMS)	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the course list. (p. 674)		12

PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project ²	4
Complete 8 semester hours from the course list. (p. 674)		8

THESIS OPTION ³

Code	Title	Hours
ME 7945	Master's Project ²	4
ME 7990	Thesis ²	4
Complete 4 semester hours from the course list. (p. 674)		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Course List

Code	Title	Hours
Any course in the following list will serve as an elective course, provided the student satisfies prerequisites and program requirements (students can take electives outside this list with prior approval from the faculty advisor):		
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
BIOE 5810	Design of Biomedical Instrumentation	
CIVE 5373	Transportation Systems: Analysis and Planning	
CIVE 5699	Special Topics in Civil Engineering (Vibration-Based Structural Health Monitoring)	
CS 5335	Robotic Science and Systems	
CS 5340	Computer/Human Interaction	
CS 7150	Deep Learning	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5576	Wireless Communication Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
IE 5617	Lean Concepts and Applications	
IE 5640	Data Mining for Engineering Applications	
IE 6600	Computation and Visualization for Analytics	
IE 6700	Data Management for Analytics	
IE 7275	Data Mining in Engineering	
IE 7300	Statistical Learning for Engineering	
IE 7315	Human Factors Engineering	
IE 7615	Neural Networks and Deep Learning	
ME 5240	Computer Aided Design and Manufacturing	
ME 5250	Robot Mechanics and Control	
ME 5665	Musculoskeletal Biomechanics	
ME 5976	Directed Study	
ME 6250	Wearable Robotics	
ME 7247	Advanced Control Engineering	
Or any other ME or MATL course or other advisor-approved courses		

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1

ENCP 6964	Co-op Work Experience
or ENCP 6954	Co-op Work Experience - Half-Time
or ENCP 6955	Co-op Work Experience Abroad - Half-Time
or ENCP 6965	Co-op Work Experience Abroad

0

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

- ¹ PlusOne students who have already successfully completed System Analysis and Control (ME 4555) may substitute Robot Mechanics and Control (ME 5250) for Control Systems Engineering (ME 5659). In such cases a different course must be taken to satisfy the mechanics competency.
- ² It is the student's responsibility to identify a project/thesis advisor before registering for this course.
- ³ Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

Mechanical Engineering with Concentration in Thermofluids, MSME (Boston)

While pursuing a Master of Science in Mechanical Engineering (<https://mie.northeastern.edu/academics/graduate-studies/ms-mece/>), students may choose thermofluids as a concentration. Some of the representative research areas under this concentration may include thermodynamics, fluid dynamics, kinetic theory of gases, and thermophoresis of aerosols; microscale heat transfer phenomena and its effects on laser beam propagation; fundamentals of combustion such as burning speed and onset of auto-ignition measurement and flame stability analysis; development of chemistry reduction such as rate-controlled constrained-equilibrium method; formation and control of combustion-generated pollutants and greenhouse gases; chemistry, transport, and abatement of air pollution; alternative energy sources; combustion-based synthesis of materials; fire propagation, containment, and extinction; nonequilibrium thermodynamics; energy and gas turbine cooling technology; turbine blade cooling; and energy-related and calorimeter studies related to pharmaceutical developments. Our research and teaching together seek to prepare students to understand and exploit thermofluids to enable their future engineering innovations.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (Coursework Only, Project, or Thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option (12 semester hours).

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Mechanical Engineering with Concentration in Thermofluids with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Mechanical Engineering with Concentration in Thermofluids in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 semester hours of advisor-approved thermofluids technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 12 semester hours of the certificate coursework may be applied to the elective requirements of this program's coursework option.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core Courses		
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
ME 7270	General Thermodynamics	4
ME 7275	Essentials of Fluid Dynamics	4
ME 7285	Heat Conduction and Thermal Radiation	4
or ME 7290	Convective Heat Transfer	
Thermofluids Concentration Course		
Complete 4 semester hours from the following:		4
ME 5685	Solar Thermal Engineering	
ME 5690	Gas Turbine Combustion	
ME 5695	Aerodynamics	
ME 7295	Multiscale Flow and Transport Phenomena	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
ME 7310	Computational Fluid Dynamics with Heat Transfer	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the course list.		12

PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project	4
Complete 8 semester hours from the course list.		8

THESIS OPTION ¹

Code	Title	Hours
ME 7945	Master's Project	4
ME 7990	Thesis	4
Complete 4 semester hours from the course list.		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

COURSE LIST

Code	Title	Hours
Any course in the following list will fulfill the coursework option, provided the student satisfies prerequisites and program requirements (students can take courses outside this list with prior approval from the faculty advisor):		
ME 5685	Solar Thermal Engineering	
ME 5690	Gas Turbine Combustion	
ME 5695	Aerodynamics	
ME 7295	Multiscale Flow and Transport Phenomena	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
ME 7310	Computational Fluid Dynamics with Heat Transfer	

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with co-op experience)
Minimum 3.000 GPA required

¹ Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

Operations Research, MSOR (Boston)

Website (<https://mie.northeastern.edu/academics/graduate-studies/ms-opre/>)

The Department of Mechanical and Industrial Engineering (MIE) offers comprehensive research and educational programs for students pursuing the Master of Science in Operations Research (MSOR). OR deals with the application of scientific method to decision making. Its practitioners develop and solve mathematical and computer models of systems using optimization and statistical methods. OR methodologies are being used to improve efficiency, reduce costs, and increase profitability in all organizations whether in manufacturing, transportation, logistics and supply chains, healthcare, or financial institutions. Upon graduation, students who pursue this program may work in industry or may continue their studies by pursuing the PhD in Industrial Engineering. These extensive programs and coursework allow for the selection of a degree that meets a wide range of personal and professional goals.

General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can

be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students may also petition to waive a core course by demonstrating evidence of their having passed a similar approved IE or OR graduate course. In such situations, the students must first obtain approval from their academic advisor for the course(s) they are planning to substitute.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (OR 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

Options for MS Students (coursework only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis option.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance, and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Operations Research with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Operations Research in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved operations research technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 16SH of the certificate coursework may be applied to the elective requirements of this program's coursework option.

GALANTE ENGINEERING BUSINESS PROGRAM

Master's Degree in Operations Research with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Operations Research in addition to earning a Graduate Certificate in Engineering Business (p. 685). Students must apply and be admitted to the Galante Engineering Business Program (<http://galante.sites.northeastern.edu/>) in order to pursue

this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University or another accredited university/college within the U.S. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the operations research core courses and 16 semester hours from the outlined business-skill curriculum. The coursework, along with participation in co-curricular professional development elements, earn the Graduate Certificate in Engineering Business.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 6200 or MATH 7241	Engineering Probability and Statistics Probability 1	4
OR 6205	Deterministic Operations Research	4
OR 7245 or MATH 7234	Network Analysis and Advanced Optimization Optimization and Complexity	4
OR 7230 or MATH 7341	Probabilistic Operation Research Probability 2	4

Options

Select one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the course list below.		16

PROJECT OPTION

Code	Title	Hours
OR 7945	Master's Project	4
Complete 12 semester hours from the course list below.		12

THESIS OPTION

Code	Title	Hours
OR 7945	Master's Project	4
OR 7990	Thesis (required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship)	4
Complete 8 semester hours from the course list below.		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Course List

Code	Title	Hours
Any course in the following list will serve as an elective course, provided the course is offered and the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the faculty advisor.		
Civil Engineering and Environmental Engineering		
CIVE 7100	Time Series and Geospatial Data Sciences	
Computer Science		
CS 5800	Algorithms	
CS 6140	Machine Learning	

CS 7805	Complexity Theory
Computer Systems Engineering	
CSYE 7280	User Experience Design and Testing
Data Science	
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
General Engineering	
GE 5010	Customer-Driven Technical Innovation for Engineers
GE 5100	Product Development for Engineers
Electrical and Computer Engineering	
EECE 5644	Introduction to Machine Learning and Pattern Recognition
Engineering Management	
EMGT 5220	Engineering Project Management
EMGT 5300	Engineering/Organizational Psychology
EMGT 6225	Economic Decision Making
EMGT 6305	Financial Management for Engineers
Industrial Engineering	
IE 5374	Special Topics in Industrial Engineering (Data Visualization Engineering)
IE 5374	Special Topics in Industrial Engineering (Human Performance in Sociotechnical Systems)
IE 5400	Healthcare Systems Modeling and Analysis
IE 5500	Systems Engineering in Public Programs
IE 5617	Lean Concepts and Applications
IE 6300	Manufacturing Systems Design
IE 7200	Supply Chain Engineering
IE 7215	Simulation Analysis
IE 7275	Data Mining in Engineering
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
IE 7290	Reliability Analysis and Risk Assessment
IE 7315	Human Factors Engineering
Mathematics	
MATH 7233	Graph Theory
MATH 7342	Mathematical Statistics
Operations Research	
OR 6500	Metaheuristics and Applications
OR 7235	Inventory Theory
OR 7240	Integer and Nonlinear Optimization
OR 7270	Convex Optimization and Applications
OR 7310	Logistics, Warehousing, and Scheduling
Or any other IE, OR, MATH, CS, and graduate engineering courses	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

AI Applications, Graduate Certificate (Boston)

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- College of Social Sciences and Humanities
- D'Amore-McKim School of Business
- Mills College at Northeastern

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

Experiential Courses

Code	Title	Hours
Complete 4 semester hours from the following:		4
CRIM 6600	Justice, Technology, and AI	
EDUT 6150	AI in Education	
HLTH 5800	AI Across the Health Sciences	
IE 5640	Data Mining for Engineering Applications	
JRNL 6460	AI in Media Industries	
MISM 6250	Strategic AI for Business	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Data Analytics Engineering, Graduate Certificate (Boston)

The Data Analytics Engineering Graduate Certificate program focuses on fundamental concepts, tools and techniques to extract information from large data sets in order to support effective decision making. This program is designed to provide opportunities for students to master high-demand data intelligence skills through hands-on experience on data storage, data retrieval, data visualization and prediction.

This four-course graduate certificate enables the students to apply the fundamentals of engineering knowledge and skills to database design, data pre- and post-processing for further analysis, data visualization for impactful infographics, statistical concepts for quantitative analysis and data mining techniques and algorithms for knowledge discovery.

Note: MS in Data Analytics students are not eligible for this graduate certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
IE 6400	Foundations for Data Analytics Engineering	4
IE 6600	Computation and Visualization for Analytics	4
IE 6700	Data Management for Analytics	4
IE 7275	Data Mining in Engineering	4

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Data Analytics Engineering, Graduate Certificate—Online

The Graduate Certificate in Data Analytics Engineering program focuses on fundamental concepts, tools, and techniques to extract information from large datasets in order to support effective decision making. This program is designed to provide opportunities for students to master high-demand data intelligence skills through hands-on experience on data storage, data retrieval, data visualization, and prediction.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 6400 or DADS 6400	Foundations for Data Analytics Engineering Foundations for Data Analytics	4
IE 6600 or DADS 6600	Computation and Visualization for Analytics Computation and Visualization for Analytics	4
IE 6700 or DADS 6700	Data Management for Analytics Data Management for Analytics	4
IE 7275 or DADS 7275	Data Mining in Engineering Machine Learning and Data Analytics	4

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Digital Platforms for Service Innovation, Graduate Certificate (Boston)

Digital platforms for providing services are online tools that connect customers with service providers smoothly, enhancing operations by simplifying communication, transactions, and delivery. Examples of digital platforms for service delivery include Uber and Airbnb. The increasing digitization of the economy and resulting growth of digital platforms have dramatically altered how individuals, organizations, and governments exchange and allocate resources. These platforms have disrupted multiple industries; upended labor economics and practices; and fundamentally transformed resource management, asset allocation, and market design. This certificate is designed to provide students with foundational knowledge about the ecosystems around digital platforms and their impact on the equitable distribution of economic opportunities in society.

The transdisciplinary training in this certificate provides students with the capacity to integrate applicable findings and theories in business, policy, and social science with ethical engineering design and practice and, conversely, the ability to succeed in emerging and dynamic work environments that are yet to be regulated and to understand how technological innovations create value for different stakeholders and impact society at large. The certificate is designed for learners who view the digital sharing economy and sociotechnical systems to be central to their future careers.

Curriculum

Differentiated tracks have been created for students coming from social sciences and business backgrounds and students coming from engineering and computer science backgrounds. The certificate requirements consist of a cross-disciplinary training course; an interdisciplinary common core course; and one elective from the following areas: modeling and algorithms, economic and policy analysis, product management, and platform-based business model innovations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
Course 1		
	Complete a cross-disciplinary training course from the appropriate course 1 option list.	3–4

This requirement offers cross-disciplinary training in one of two areas: in social sciences or business for learners with a background in engineering or computer science and in knowledge engineering for learners with a background in the social sciences or business. Students should complete one of the courses listed below or submit a petition to their advisor for a different course that they believe is suitable. Some options to meet this course 1 requirement are prerequisites of options to meet the course 3 requirement of this program. Students are encouraged to examine course 3 options when planning their course 1 selection.

Course 1 for Learners with Background in Engineering or Computer Science

PHIL 5005	Information Ethics
PHIL 5010	AI Ethics
PPUA 5262	Big Data for Cities
PPUA 6502	Economic Analysis for Policy and Planning

Course 1 for Learners with Background in the Social Sciences or Business

CS 5800	Algorithms
IE 6400	Foundations for Data Analytics Engineering

Course 2

ENGR 6010	Fundamentals of the Platform Economy	4

Course 3

Complete an elective from one of the following elective lists. Students should choose one of the courses listed below or submit a petition for a different course they believe is suitable. Some options to complete this requirement have prerequisites outside the curriculum for this certificate program.

3–4

Modeling and Algorithms Electives

CIVE 7100	Time Series and Geospatial Data Sciences
CIVE 7380	Performance Models and Simulation of Transportation Networks
CIVE 7381	Transportation Demand Forecasting and Model Estimation
CS 5340	Computer/Human Interaction
CS 5800	Algorithms
ECON 5140	Applied Econometrics
EECE 5642	Data Visualization
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering
IE 6200	Engineering Probability and Statistics
IE 7215	Simulation Analysis
IE 7275	Data Mining in Engineering
OR 6205	Deterministic Operations Research
PPUA 5261	Dynamic Modeling for Environmental Decision Making

Urban Affairs Electives

CIVE 5373	Transportation Systems: Analysis and Planning
CIVE 6566	Sustainable Urban Transportation: Netherlands
CIVE 7385	Public Transportation
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5265	Global Urbanization and Planning
PPUA 5266	Urban Theory and Science
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context
PPUA 7237	Advanced Spatial Analysis of Urban Systems

Policy and Regulation Electives

ENSY 5000	Fundamentals of Energy System Integration
PPUA 5260	Ecological Economics
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change
PPUA 6500	Principles of Public Administration
PPUA 6502	Economic Analysis for Policy and Planning
PPUA 6506	Techniques of Policy Analysis

Energy and Environment Electives

CIVE 5363	Climate Science, Engineering Adaptation, and Policy
CIVE 5699	Special Topics in Civil Engineering

Product Management and Platform-Based Business Model Innovations Electives

EMGT 6225	Economic Decision Making
ENTR 6218	Business Model Design and Innovation
MKTG 6200	Creating and Sustaining Customer Markets
MKTG 6214	New Product Development
MKTG 6283	Marketing and Selling Innovation

Students who complete the requirements above at less than the required 12 semester hours for this certificate should consult with their advisor regarding 1-semester-hour and/or 2-semester-hour course options to complete program requirements.

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Energy Systems, Graduate Certificate (Boston)

The Graduate Certificate in Energy Systems focuses on the combination of analysis and integration of energy systems engineering technology with financial planning and attention to business aspects and effective implementation.

This four-course graduate certificate seeks to offer students opportunities to apply the fundamentals of engineering knowledge and skills to analyze energy systems to propose effective and efficient technology solutions based on data-driven and economic-based decisions.

Note: Students enrolled in the master's in energy systems program are not eligible for this graduate certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4
ENSY 5000	Fundamentals of Energy System Integration	4

Elective

Code	Title	Hours
Complete one of the following course, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor.		4

ENSY 5100	Hydropower
ENSY 5200	Energy Storage Systems
ENSY 5300	Electrochemical Energy Storage
ENSY 5400	Power Plant Design and Analysis
ENSY 5500	Smart Grid
ENSY 5585	Wind Energy Systems
ME 5685	Solar Thermal Engineering

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Energy Systems Management, Graduate Certificate (Boston)

The Graduate Certificate in Energy Systems Management focuses on the combination of analysis and integration of energy systems engineering technology with a focus on the art and the science of planning, organizing, allocating, directing, and controlling the activities and resources of organizations engaged in engineering activities and technology development.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills in a management setting to analyze energy systems and to propose effective and efficient technology solutions based on data-driven and economic-based decisions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ENSY 5000	Fundamentals of Energy System Integration	4
EMGT 5220	Engineering Project Management	4

Electives

Code	Title	Hours
Complete one of the following, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor:		4
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
Complete one of the following, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor:		4
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5400	Power Plant Design and Analysis	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ME 5685	Solar Thermal Engineering	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Engineering Business, Graduate Certificate (Boston)

The Graduate Certificate in Engineering Business is part of the Galante Engineering Business Program. The Galante Engineering Business Program offers a progressive opportunity for engineering students to complement their technical engineering education with business skills. Galante is founded on the values of student engagement and leadership to strengthen interpersonal and professional skills.

The certificate seeks to provide students opportunities to apply the technical aspects of an engineering skill foundation in corporate settings through both academic and programmatic elements. Programmatic elements include workshops, speaker series, site visits, seminars, and other related personal and professional development activities as a connected cohort. These activities equip students to manage projects, lead people, make data-driven and market-based decisions, and advance economically sound initiatives.

The Galante Engineering Business Program can be completed concurrently with the following degree programs:

- MSBioE Bioengineering with Concentration in Biomedical Devices and Bioimaging (p. 493) (Boston)
- MSChE Chemical Engineering (p. 509) (Boston)
- MSCivE Civil Engineering with Concentration in Construction Management (p. 526) (Boston)
- MS Data Analytics Engineering (p. 628) (Boston)
- MSECE Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms (Boston)
- MSECE Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence (p. 601) (Boston)
- MSEM Engineering Management (p. 655) (Boston)
- MS Human Factors (p. 638) (Boston)
- MSIE Industrial Engineering (p. 651) (Boston)
- MSME Mechanical Engineering with Concentration in Mechatronics (p. 672) (Boston)
- MSOR Operations Research (p. 677) (Boston)

The Graduate Certificate in Engineering Business requires 15 semester hours from four courses across three categories. Students should consult with a COE advisor whether any courses completed for this certificate may also fulfill requirements of the student's concurrent master's program.

Refer to the Galante Engineering Business Program webpage (<https://galante.sites.northeastern.edu/>) for additional details and description.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete four courses from at least three of the following categories. A maximum of one course offered by a college outside the College of Engineering may be applied to this requirement:		15
Business Innovation Development		
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
EMGT 6700	Digital Product Design and Management	
ENTR 6212	Business Planning for New Ventures	
ENTR 6218	Business Model Design and Innovation	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6300	Managing a Technology-Based Business	
ENTR 6340	The Technical Entrepreneur as Leader	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5020	Engineering Product Design Methodology	
GE 5030	Iterative Product Prototyping for Engineers	
GE 5100	Product Development for Engineers	
INNO 6200	Enterprise Growth and Innovation	
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	
Organizational Excellence		
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6600	Engineering Team Performance	
ENTR 6250	Lean Design and Development	
IE 5617	Lean Concepts and Applications	
SCHM 6201	Operations and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
PHIL 5010	AI Ethics	
Financial Analysis		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
BIOE 5510	Bioengineering Products/Technology Commercialization	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
Information and Business Analysis		
IE 7300	Statistical Learning for Engineering	
or BIOE 5860	Engineering Approaches to Precision Medicine I	
or BIOE 5880	Computational Methods in Systems Bioengineering	
or CS 6140	Machine Learning	
or CS 6220	Data Mining Techniques	
or DA 5030	Introduction to Data Mining/Machine Learning	
or EECE 5644	Introduction to Machine Learning and Pattern Recognition	
DAMG 6210	Data Management and Database Design	
or IE 6700	Data Management for Analytics	
DS 5110	Essentials of Data Science	
IE 5640	Data Mining for Engineering Applications	
or IE 7275	Data Mining in Engineering	
or CS 6220	Data Mining Techniques	
IE 6600	Computation and Visualization for Analytics	

or EECE 5642

Data Visualization

INFO 6215

Business Analysis and Information Engineering

Program Credit/GPA Requirements

15 total semester hours required

Minimum 3.000 GPA required

Engineering Economic Decision Making, Graduate Certificate (Boston)

The Graduate Certificate in Engineering Economic Decision Making focuses on developing economic decision-making skills in the context of engineering operations and projects with attention to decision-making models, causes of risk and uncertainty, decisions under uncertainty, and ways to change and influence the degree of risk and uncertainty.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills in a management setting to build decision-making models and to make data-driven, financial-based, and economic-based decisions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Engineering Management, Graduate Certificate (Boston)

The Graduate Certificate in Engineering Management focuses on bridging the gaps between the fields of engineering, technology, and business with a focus on the art and the science of planning, organizing, allocating, directing, and controlling the activities and resources of organizations engaged in engineering activities and technology development.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills in a management setting to build decision-making models and make data-driven and/or economic-based decisions.

Note: Students enrolled in the master's in engineering management program are not eligible for this graduate certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
EMGT 5220	Engineering Project Management	4
EMGT 6225	Economic Decision Making	4
IE 6200	Engineering Probability and Statistics	4

Elective

Code	Title	Hours
Complete one of the following, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor:		
EMGT 5300	Engineering/Organizational Psychology	4
EMGT 6305	Financial Management for Engineers	
OR 6205	Deterministic Operations Research	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Lean Six Sigma, Graduate Certificate (Boston)

The Graduate Certificate in Lean Six Sigma focuses on enhancing engineering knowledge and skills with the fundamentals of lean manufacturing thinking and six sigma concepts to improve business processes through optimizing flow, eliminating waste, and emphasizing quality.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of lean six sigma concepts across an enterprise to contribute to an organization's continuous improvement initiatives by identifying and employing lean and quality tools and techniques, along with utilizing statistical methods to achieve quality control.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 5617	Lean Concepts and Applications	4
IE 6200	Engineering Probability and Statistics	4
IE 7280	Statistical Methods in Engineering	4
IE 7285	Statistical Quality Control	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Renewable Energy, Graduate Certificate (Boston)

The Graduate Certificate in Renewable Energy focuses on the combination of analysis and integration of energy systems engineering technology with key renewable engineering technology, including solar and wind generation, with environmental protection and manufacturing considerations.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to analyze energy systems with a specific focus on renewable energy technologies along with EPA regulatory structure, including the LEED certification program, as well as industrial ecology, including life-cycle analysis and technical cost modeling.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ENSY 5000	Fundamentals of Energy System Integration	4
ENSY 5585	Wind Energy Systems	4
ME 5685	Solar Thermal Engineering	4

Elective

Code	Title	Hours
Complete one of the following, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor:		4
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5500	Smart Grid	

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Software Engineering Systems, Graduate Certificate (Boston)

The Graduate Certificate in Software Engineering Systems focuses on the sociotechnical approach to software engineering with attention on using engineering tools and considering real-world complexities to design and construct practical and viable software solutions.

This four-course graduate certificate is designed to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to software development with attention on enterprise design and integration, secure systems design and creation, and data integration and architecture.

Note: Master of Science in Software Engineering Systems students are not eligible for this graduate certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
CSYE 6200	Concepts of Object-Oriented Design	4
INFO 6205	Program Structure and Algorithms	4

Electives

Code	Title	Hours
Complete two of the following:		8
CSYE 6225	Network Structures and Cloud Computing	
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	
CSYE 7280	User Experience Design and Testing	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Supply Chain Engineering Management, Graduate Certificate (Boston)

The Graduate Certificate in Supply Chain focuses on acquiring and applying the knowledge and skills associated with designing, analyzing, managing, and improving supply chains within technology companies with attention on optimizing parts of a supply chain for effective and efficient functioning.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to supply chains using deterministic and probabilistic decision-making models, lean concepts, mass customization principles, and methods of manufacturing including logistics, warehousing, and scheduling.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
IE 5617	Lean Concepts and Applications	4
IE 7200	Supply Chain Engineering	4

Electives

Code	Title	Hours
Complete two of the following, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor:		8
EMGT 5300	Engineering/Organizational Psychology	
IE 6200	Engineering Probability and Statistics	
IE 6300	Manufacturing Systems Design	
OR 7310	Logistics, Warehousing, and Scheduling	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Sustainable Energy Systems, Graduate Certificate (Boston)

The Graduate Certificate in Sustainable Energy Systems focuses on the integration of energy systems engineering technology with sustainable building systems, including the design and operation of buildings with minimal energy and environmental impact.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to analyze energy systems as they relate to sustainable engineering building design with a focus on renewable energy with LEED certification or with a focus on industrial ecology, including life-cycle analysis and technical cost modeling.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
SBSY 5200	Sustainable Engineering Systems for Buildings	4
ENSY 5000	Fundamentals of Energy System Integration	4

Electives

Code	Title	Hours
Complete two of the following, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor:		8
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5585	Wind Energy Systems	
ME 5685	Solar Thermal Engineering	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Technology Systems Management, Graduate Certificate (Boston)

The Graduate Certificate in Technology Systems Management focuses on bridging the fields of technology, engineering, and business with a focus on the art and the science of managing organizational activities, including project and human resources engaged in engineering and technology development.

This four-course graduate certificate seeks to provide students with opportunities to apply technological knowledge and skills in a management setting to make data-driven, financial-based, and economic-based decisions.

Note: This certificate is for graduate engineering students as well as non-engineers and non-graduate engineering students.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
EMGT 5220	Engineering Project Management	4
EMGT 5300	Engineering/Organizational Psychology	4
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Multidisciplinary Programs

Website (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/>)

Dana Research Center, 5th Floor

The multidisciplinary graduate engineering Master of Science programs integrate engineering solutions from the fields of technology and business by developing technical and engineering skills through advanced coursework and complex technical projects. Each program focuses on the application of knowledge and skills to business and industrial settings. The software, data, and network systems programs blend academic and corporate experience to enable students to enhance their professional capabilities, thereby facilitating career transformation. Given an applied focus, each program provides learning opportunities to develop the skills needed to create innovative, practical, and effective solutions that can be easily applied to current professional challenges.

The multidisciplinary graduate engineering programs are designed to prepare students for direct entry into the workforce. Students who are seeking preparation for entry into PhD programs should consider specific department MS programs (p. 460) aligned with their research interests.

Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 1349) in combination with the MS degree.

Programs

Master of Science in Information Systems (MSIS)

-
- Information Systems (Boston) (p. 693)
- Information Systems (Arlington) (p. 692)
- Information Systems (Miami) (p. 695)
- Information Systems (Oakland) (p. 697)
- Information Systems (Portland) (p. 698)
- Information Systems (Seattle) (p. 700)
- Information Systems (Silicon Valley) (p. 701)
- Information Systems (Toronto) (p. 702)
- Information Systems (Vancouver) (p. 704)
- Information Systems—Bridge (Boston) (p. 710)
- Information Systems—Bridge (Arlington) (p. 708)
- Information Systems—Bridge (Miami) (p. 711)
- Information Systems—Bridge (Oakland) (p. 713)
- Information Systems (p. 713)— (p. 713) Bridge (Portland) (p. 713)
- Information Systems—Bridge (Seattle) (p. 714)
- Information Systems—Bridge (Silicon Valley) (p. 716)
- Information Systems—Bridge (Toronto) (p. 716)
- Information Systems—Bridge (Vancouver) (p. 719)
- Information Systems—Bridge—Online (p. 721)
- Information Systems—Online (p. 706)

Master of Science (MS)

- Cyber-Physical Systems (Boston) (p. 722)
- Cyber-Physical Systems (Toronto) (p. 723)
- Data Architecture and Management (Boston) (p. 724)
- Data Architecture and Management (Seattle) (p. 725)
- Data Architecture and Management (Toronto) (p. 728)
- Software Engineering Systems (Boston) (p. 732)
- Software Engineering Systems (Arlington) (p. 730)
- Software Engineering Systems (Toronto) (p. 733)
- Telecommunication Networks (Boston) (p. 735)

Graduate Certificates

-
- Blockchain and Smart Contract Engineering (Boston) (p. 737)
- Blockchain and Smart Contract Engineering (Arlington) (p. 737)
- Broadband Wireless Systems (Boston) (p. 738)
- Engineering Leadership (Boston) (p. 738)
- IP Telephony Systems (Boston) (p. 740)
- Medical Software Engineering (Boston) (p. 740)
- Software Engineering Systems (Boston) (p. 689)
- Software Engineering Systems (Arlington) (p. 741)

Information Systems, MSIS (Arlington)

We offer cutting-edge expertise in a variety of courses that combine technological advances and business practices. We stress creative and inventive approaches to problem solving, which necessitates empowering students so that they can take charge of their own software projects to become originally productive. Our information systems program (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy/>) is as much an art as a science. It bypasses mechanical learning and highlights the value and excitement of engineering thinking that gets things done efficiently as well as imaginatively. We balance theory and practice, on the premise that they are always intertwined and interdependent.

We seek to provide a basic foundation for our students and then seek to push them to new heights to advance their information technology skills in a way that keeps up and, better yet, exceeds the necessarily fast pace of this progressive field. It is not for us just a question of not being left behind; we strive to be at the forefront of software innovation in an effort to transform contemporary society even more radically than technology has already done—to take gigantic strides in business, medicine, education, and security.

The program offers a wide range of courses that reflect current and future industry trends:

- Cryptocurrency and Smart Contract Engineering
- Engineering of Big-Data Systems
- Business Intelligence and Data Analytics
- Cyber-Security Engineering and Development
- Digital Business
- Full-Stack Software Engineering
- User Experience Design
- Data Science and Machine Learning Systems Engineering

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the Restricted Electives course list below. (p. 693)		16
Complete 12 semester hours from the Other Electives course list below. (p. 693)		12

PROJECT OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
Complete 24 semester hours from the Electives course list below. A minimum of 16 semester hours must be INFO courses.		24

THESIS OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
INFO 7990	Thesis	4
Complete 20 semester hours from the Electives course list below. A minimum of 16 semester hours must be INFO courses.		20

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

Restricted Electives Course List

Code	Title	Hours
Complete courses from the following subject code:		
INFO		

Other Electives Course List

Code	Title	Hours
Complete courses from any of the following subject codes:		
CSYE (except CSYE 6220)		
DAMG		
INFO		
TELE		

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6000 to qualify for co-op experience:		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Information Systems, MSIS (Boston)

We offer cutting-edge expertise in a variety of courses that combine technological advances and business practices. We stress creative and inventive approaches to problem solving, which necessitates empowering students so that they can take charge of their own software projects to become originally productive. Our information systems program (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy/>) is as much an art as a science. It bypasses mechanical learning and highlights the value and excitement of engineering thinking that gets things done efficiently as well as imaginatively. We balance theory and practice, on the premise that they are always intertwined and interdependent.

We seek to provide a basic foundation for our students and then seek to push them to new heights to advance their information technology skills in a way that keeps up and, better yet, exceeds the necessarily fast pace of this progressive field. It is not for us just a question of not being left behind; we strive to be at the forefront of software innovation in an effort to transform contemporary society even more radically than technology has already done—to take gigantic strides in business, medicine, education, and security.

The program offers a wide range of courses that reflect current and future industry trends:

- Cryptocurrency and Smart Contract Engineering
- Engineering of Big-Data Systems
- Business Intelligence and Data Analytics
- Cybersecurity Engineering and Development
- Digital Business

- Full-Stack Software Engineering
- User Experience Design
- Data Science and Machine Learning Systems Engineering

Gordon Institute of Engineering Leadership

MASTER'S DEGREE IN INFORMATION SYSTEMS WITH GRADUATE CERTIFICATE IN ENGINEERING LEADERSHIP

Students may complete a master's degree in Information Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 semester hours of advisor-approved information systems technical courses. For students who enroll in the Graduate Certificate in Engineering Leadership, 16 semester hours of the certificate coursework may be applied to this program's elective requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Options

Complete one of the following options. Students may also choose to complete the Optional Concentration in Medical Software Engineering (p. 694) and apply concentration coursework to restricted electives or other electives requirements of these options.

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the restricted electives course list below. (p. 695)		16
Complete 12 semester hours from the other electives course list below. (p. 695)		12

PROJECT OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
Complete 12 semester hours from the restricted electives course list below. (p. 695)		12
Complete 12 semester hours from the other electives course list below. (p. 695)		12

THESIS OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
INFO 7990	Thesis	4
Complete 8 semester hours from the restricted electives course list below. (p. 695)		8
Complete 12 semester hours from the other electives course list below. (p. 695)		12

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Concentration in Medical Software Engineering

A concentration is not required. Students may complete the following concentration in medical software engineering and apply concentration courses to restricted electives or other electives requirements of the program's coursework, project, or thesis options.

Code	Title	Hours
CSYE 7280	User Experience Design and Testing	4
INFO 7405	Advances in Engineering Medical Information Systems	4
INFO 7410	Advanced Medical Device Software Engineering	4

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6000 to qualify for co-op experience):		
ENCP 6000	Career Management for Engineers	1

ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

RESTRICTED ELECTIVES COURSE LIST

Code	Title	Hours
Complete courses from the following subject code:		
INFO		

OTHER ELECTIVES COURSE LIST

Code	Title	Hours
Complete courses from any of the following subject codes:		
CSYE (except CSYE 6220)		
DAMG		
INFO		
TELE		

Information Systems, MSIS (Miami)

We offer cutting-edge expertise in a variety of courses that combine technological advances and business practices. We stress creative and inventive approaches to problem solving, which necessitates empowering students so that they can take charge of their own software projects to become originally productive. Our information systems program (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy/>) is as much an art as a science. It bypasses mechanical learning and highlights the value and excitement of engineering thinking that gets things done efficiently as well as imaginatively. We balance theory and practice, on the premise that they are always intertwined and interdependent.

We seek to provide a basic foundation for our students and then seek to push them to new heights to advance their information technology skills in a way that keeps up and, better yet, exceeds the necessarily fast pace of this progressive field. It is not for us just a question of not being left behind; we strive to be at the forefront of software innovation in an effort to transform contemporary society even more radically than technology has already done—to take gigantic strides in business, medicine, education, and security.

The program offers a wide range of courses that reflect current and future industry trends:

- Cryptocurrency and Smart Contract Engineering
- Engineering of Big-Data Systems
- Business Intelligence and Data Analytics
- Cyber-Security Engineering and Development
- Digital Business
- Full-Stack Software Engineering
- User Experience Design
- Data Science and Machine Learning Systems Engineering

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Complete 28 semester hours from the Electives course list below. A minimum of 16 semester hours must be INFO courses.
(p. 696) 28

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6000 to qualify for co-op experience:		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)
Minimum 3.000 GPA required

Electives

Code	Title	Hours
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6202	Concepts of Object-Oriented Design with C#	
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	
CSYE 6305	Introduction to Quantum Computing with Applications	
CSYE 7105	High-Performance Parallel Machine Learning and AI	
CSYE 7125	Advanced Cloud Computing	
CSYE 7200	Big-Data System Engineering Using Scala	
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	
CSYE 7220	Deployment and Operation of Software Applications	
CSYE 7230	Software Engineering	
CSYE 7270	Building Virtual Environments	
CSYE 7370	Deep Learning and Reinforcement Learning in Game Engineering	
CSYE 7374	Special Topics in Computer Systems Engineering	
CSYE 7380	Theory and Practical Applications of AI Generative Modeling	
CSYE 7470	Advanced Game Analytics	
CSYE 7550	Distributed Intelligent Agents in the Metaverse	
CSYE 7990	Thesis	
DAMG 6105	Data Science Engineering with Python	
DAMG 6210	Data Management and Database Design	
DAMG 7250	Big Data Architecture and Governance	
DAMG 7275	Advanced Database Management Systems	
DAMG 7325	Introduction to Information Technology Auditing	
DAMG 7350	Systems and Cybersecurity Fundamentals	
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	
DAMG 7374	Special Topics in Data Architecture and Management	
INFO 5001	Application Modeling and Design	
INFO 6105	Data Science Engineering Methods and Tools	
INFO 6106	Neural Modeling Methods and Tools	
INFO 6150	Web Design and User Experience Engineering	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6250 and INFO 6251	Web Development Tools and Methods and Lab for INFO 6250	

INFO 6255	Software Quality Control and Management
INFO 6660	Business Ethics and Intellectual Property for Engineers
INFO 7110	High-Performance Coding for Fintech
INFO 7205	Advanced Application Engineering Project
INFO 7225	Accounting and Budgetary Systems for Engineers
INFO 7245	Agile Software Development
INFO 7255	Advanced Big-Data Applications and Indexing Techniques
INFO 7260	Business Process Engineering
INFO 7285	Organizational Change and IT
INFO 7330	Information Systems for Healthcare Services Delivery
INFO 7374	Special Topics in Information Systems
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications
INFO 7385	Managerial Communications for Engineers
INFO 7405	Advances in Engineering Medical Information Systems
INFO 7945	Master's Project
INFO 7990	Thesis

Information Systems, MSIS (Oakland)

We offer cutting-edge expertise in a variety of courses that combine technological advances and business practices. We stress creative and inventive approaches to problem solving, which necessitates empowering students so that they can take charge of their own software projects to become originally productive. Our information systems program (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy/>) is as much an art as a science. It bypasses mechanical learning and highlights the value and excitement of engineering thinking that gets things done efficiently as well as imaginatively. We balance theory and practice, on the premise that they are always intertwined and interdependent.

We seek to provide a basic foundation for our students and then seek to push them to new heights to advance their information technology skills in a way that keeps up and, better yet, exceeds the necessarily fast pace of this progressive field. It is not for us just a question of not being left behind; we strive to be at the forefront of software innovation in an effort to transform contemporary society even more radically than technology has already done—to take gigantic strides in business, medicine, education, and security.

The program offers a wide range of courses that reflect current and future industry trends:

- Cryptocurrency and Smart Contract Engineering
- Engineering of Big-Data Systems
- Business Intelligence and Data Analytics
- Cyber-Security Engineering and Development
- Digital Business
- Full-Stack Software Engineering
- User Experience Design
- Data Science and Machine Learning Systems Engineering

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the electives course list below.		12

PROJECT OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
Complete 8 semester hours from the electives course list below.		8

THESIS OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
INFO 7990	Thesis	4
Complete 4 semester hours from the electives course list below.		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

Electives

Code	Title	Hours
Complete 16 semester hours from the following subject codes:		16
CSYE (except CSYE 6220)		
DAMG		
INFO		
TELE		

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Information Systems, MSIS (Portland)

We offer cutting-edge expertise in a variety of courses that combine technological advances and business practices. We stress creative and inventive approaches to problem solving, which necessitates empowering students so that they can take charge of their own software projects to become originally productive. Our information systems program (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy/>) is as much an art as a science. It bypasses mechanical learning and highlights the value and excitement of engineering thinking that gets things done efficiently as well as imaginatively. We balance theory and practice, on the premise that they are always intertwined and interdependent.

We seek to provide a basic foundation for our students and then seek to push them to new heights to advance their information technology skills in a way that keeps up and, better yet, exceeds the necessarily fast pace of this progressive field. It is not for us just a question of not being left behind; we strive to be at the forefront of software innovation in an effort to transform contemporary society even more radically than technology has already done—to take gigantic strides in business, medicine, education, and security.

The program offers a wide range of courses that reflect current and future industry trends:

- Cryptocurrency and Smart Contract Engineering
- Engineering of Big-Data Systems
- Business Intelligence and Data Analytics
- Cyber-Security Engineering and Development
- Digital Business
- Full-Stack Software Engineering
- User Experience Design
- Data Science and Machine Learning Systems Engineering

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the Restricted Electives course list below.		16
Complete 12 semester hours from the Other Electives course list below.		12

PROJECT OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
Complete 12 semester hours from the Restricted Electives course list below.		12
Complete 12 semester hours from the Other Electives course list below.		12

THESIS OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
INFO 7990	Thesis	4
Complete 8 semester hours from the Restricted Electives course list below.		8
Complete 12 semester hours from the Other Electives course list below.		12

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

Restricted Electives Course List

Code	Title	Hours
Complete courses from the following subject code:		
INFO		

Other Electives Course List

Code	Title	Hours
Complete courses from any of the following subject codes:		
CSYE (except CSYE 6220)		
DAMG		
INFO		
TELE		

Optional Co-Op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6000 to qualify for co-op experience:		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Information Systems, MSIS (Seattle)

We offer cutting-edge expertise in a variety of courses that combine technological advances and business practices. We stress creative and inventive approaches to problem solving, which necessitates empowering students so that they can take charge of their own software projects to become originally productive. Our information systems program (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy/>) is as much an art as a science. It bypasses mechanical learning and highlights the value and excitement of engineering thinking that gets things done efficiently as well as imaginatively. We balance theory and practice, on the premise that they are always intertwined and interdependent.

We seek to provide a basic foundation for our students and then seek to push them to new heights to advance their information technology skills in a way that keeps up and, better yet, exceeds the necessarily fast pace of this progressive field. It is not for us just a question of not being left behind; we strive to be at the forefront of software innovation in an effort to transform contemporary society even more radically than technology has already done—to take gigantic strides in business, medicine, education, and security.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Coursework

Code	Title	Hours
Complete 28 semester hours from the electives course list below. (p. 700)		28

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Electives

Code	Title	Hours
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	
CSYE 6305	Introduction to Quantum Computing with Applications	
CSYE 7125	Advanced Cloud Computing	
CSYE 7230	Software Engineering	
CSYE 7280	User Experience Design and Testing	
CSYE 7374	Special Topics in Computer Systems Engineering	
CSYE 7380	Theory and Practical Applications of AI Generative Modeling	
DAMG 6105	Data Science Engineering with Python	
DAMG 6210	Data Management and Database Design	
DAMG 7245	Big-Data Systems and Intelligence Analytics	
DAMG 7250	Big Data Architecture and Governance	
DAMG 7275	Advanced Database Management Systems	
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	
DAMG 7374	Special Topics in Data Architecture and Management	
ENCP 6000	Career Management for Engineers	
INFO 6105	Data Science Engineering Methods and Tools	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6250 and INFO 6251	Web Development Tools and Methods and Lab for INFO 6250	

INFO 6255	Software Quality Control and Management
INFO 6350	Smartphones-Based Web Development
INFO 6660	Business Ethics and Intellectual Property for Engineers
INFO 7225	Accounting and Budgetary Systems for Engineers
INFO 7245	Agile Software Development
INFO 7250	Engineering of Big-Data Systems
INFO 7255	Advanced Big-Data Applications and Indexing Techniques
INFO 7260	Business Process Engineering
INFO 7285	Organizational Change and IT
INFO 7374	Special Topics in Information Systems
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications
INFO 7380	User Experience Design for Healthcare Applications
INFO 7385	Managerial Communications for Engineers
INFO 7390	Advances in Data Sciences and Architecture
INFO 7500	Cryptocurrency and Smart Contract Engineering
INFO 7510	Smart Contract Application Engineering and Development
INFO 7610	Special Topics in Natural Language Engineering Methods and Tools
INFO 7945	Master's Project
INFO 7976	Directed Study
INFO 7990	Thesis

Information Systems, MSIS (Silicon Valley)

We offer cutting-edge expertise in a variety of courses that combine technological advances and business practices. We stress creative and inventive approaches to problem solving, which necessitates empowering students so that they can take charge of their own software projects to become originally productive. Our information systems program (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy/>) is as much an art as a science. It bypasses mechanical learning and highlights the value and excitement of engineering thinking that gets things done efficiently as well as imaginatively. We balance theory and practice, on the premise that they are always intertwined and interdependent.

We seek to provide a basic foundation for our students and then seek to push them to new heights to advance their information technology skills in a way that keeps up and, better yet, exceeds the necessarily fast pace of this progressive field. It is not for us just a question of not being left behind; we strive to be at the forefront of software innovation in an effort to transform contemporary society even more radically than technology has already done—to take gigantic strides in business, medicine, education, and security.

The program offers a wide range of courses that reflect current and future industry trends:

- Cryptocurrency and Smart Contract Engineering
- Engineering of Big-Data Systems
- Business Intelligence and Data Analytics
- Cyber-Security Engineering and Development
- Digital Business
- Full-Stack Software Engineering
- User Experience Design
- Data Science and Machine Learning Systems Engineering

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the electives course list below.		12

PROJECT OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
Complete 8 semester hours from the electives course list below.		8

THESIS OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
INFO 7990	Thesis	4
Complete 4 semester hours from the electives course list below.		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

Electives

Code	Title	Hours
Complete 16 semester hours from the following subject codes:		16
CSYE (except CSYE 6220)		
DAMG		
INFO		
TELE		

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Information Systems, MSIS (Toronto)

We offer cutting-edge expertise in a variety of courses that combine technological advances and business practices. We stress creative and inventive approaches to problem solving, which necessitates empowering students so that they can take charge of their own software projects to become originally productive. Our information systems program (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy/>) is as much an art as a science. It bypasses mechanical learning and highlights the value and excitement of engineering thinking that gets things done efficiently as well as imaginatively. We balance theory and practice, on the premise that they are always intertwined and interdependent.

We seek to provide a basic foundation for our students and then seek to push them to new heights to advance their information technology skills in a way that keeps up and, better yet, exceeds the necessarily fast pace of this progressive field. It is not for us just a question of not being left behind; we strive to be at the forefront of software innovation in an effort to transform contemporary society even more radically than technology has already done—to take gigantic strides in business, medicine, education, and security.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Options

Complete one of the following options:

PROJECT OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
Complete 24 semester hours from the Electives course list below. A minimum of 12 semester hours must be INFO courses. (p. 703)		24

THESIS OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
INFO 7990	Thesis	4
Complete 20 semester hours from the Electives course list below. A minimum of 8 semester hours must be INFO courses. (p. 703)		20

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Electives

Code	Title	Hours
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	
CSYE 6305	Introduction to Quantum Computing with Applications	
CSYE 7105	High-Performance Parallel Machine Learning and AI	
CSYE 7125	Advanced Cloud Computing	
CSYE 7200	Big-Data System Engineering Using Scala	
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	
CSYE 7220	Deployment and Operation of Software Applications	
CSYE 7230	Software Engineering	
CSYE 7235	Model-Driven Architecture	
CSYE 7270	Building Virtual Environments	
CSYE 7280	User Experience Design and Testing	
CSYE 7374	Special Topics in Computer Systems Engineering	
CSYE 7380	Theory and Practical Applications of AI Generative Modeling	
DAMG 6105	Data Science Engineering with Python	
DAMG 6210	Data Management and Database Design	
DAMG 7245	Big-Data Systems and Intelligence Analytics	
DAMG 7250	Big Data Architecture and Governance	
DAMG 7275	Advanced Database Management Systems	
DAMG 7350	Systems and Cybersecurity Fundamentals	
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	
DAMG 7374	Special Topics in Data Architecture and Management	
INFO 5001	Application Modeling and Design	
INFO 5002	Introduction to Python for Information Systems	
INFO 6105	Data Science Engineering Methods and Tools	
INFO 6106	Neural Modeling Methods and Tools	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6250 and INFO 6251	Web Development Tools and Methods and Lab for INFO 6250	
INFO 6255	Software Quality Control and Management	
INFO 6350	Smartphones-Based Web Development	
INFO 6660	Business Ethics and Intellectual Property for Engineers	

INFO 7110	High-Performance Coding for Fintech
INFO 7225	Accounting and Budgetary Systems for Engineers
INFO 7245	Agile Software Development
INFO 7250	Engineering of Big-Data Systems
INFO 7255	Advanced Big-Data Applications and Indexing Techniques
INFO 7260	Business Process Engineering
INFO 7285	Organizational Change and IT
INFO 7374	Special Topics in Information Systems
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications
INFO 7380	User Experience Design for Healthcare Applications
INFO 7385	Managerial Communications for Engineers
INFO 7390	Advances in Data Sciences and Architecture
INFO 7405	Advances in Engineering Medical Information Systems
INFO 7410	Advanced Medical Device Software Engineering
INFO 7500	Cryptocurrency and Smart Contract Engineering
INFO 7510	Smart Contract Application Engineering and Development
INFO 7520	Engineering of Advanced Cryptocurrency Systems
INFO 7525	Regulatory Aspects of Smart Contract Automation
INFO 7535	Digital Smart Contracts Product Innovations
INFO 7610	Special Topics in Natural Language Engineering Methods and Tools
INFO 7976	Directed Study
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330
TELE 5350	Telecom and Network Infrastructure
TELE 5360	Internet Protocols and Architecture
TELE 5600	Linux/UNIX Systems Management for Network Engineers
TELE 6300	Communication and Network Security
TELE 6400	Software-Defined Networking
TELE 6420	Infrastructure Automation Design and Tools
TELE 6500	Machine Learning for IoT Systems
TELE 6510	Fundamentals of the Internet of Things
TELE 6530	Connected Devices
TELE 6550	IoT Embedded System Design
TELE 7374	Special Topics in the Internet of Things

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6000 to qualify for co-op experience:		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Information Systems, MSIS (Vancouver)

We offer cutting-edge expertise in a variety of courses that combine technological advances and business practices. We stress creative and inventive approaches to problem solving, which necessitates empowering students so that they can take charge of their own software projects to become originally productive. Our information systems program (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy/>) is as much an art as a science. It bypasses mechanical learning and highlights the value and excitement of engineering thinking that gets things done efficiently as well as imaginatively. We balance theory and practice, on the premise that they are always intertwined and interdependent.

We seek to provide a basic foundation for our students and then seek to push them to new heights to advance their information technology skills in a way that keeps up and, better yet, exceeds the necessarily fast pace of this progressive field. It is not for us just a question of not being left behind; we strive to be at the forefront of software innovation in an effort to transform contemporary society even more radically than technology has already done—to take gigantic strides in business, medicine, education, and security.

The program offers a wide range of courses that reflect current and future industry trends:

- Cryptocurrency and Smart Contract Engineering
- Engineering of Big-Data Systems
- Business Intelligence and Data Analytics
- Cyber-Security Engineering and Development
- Digital Business
- Full-Stack Software Engineering
- User Experience Design
- Data Science and Machine Learning Systems Engineering

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Project or Thesis Option

Complete one of the following options:

PROJECT OPTION

Code	Title	Hours
INFO 7976	Directed Study	4

THESIS OPTION

Code	Title	Hours
Complete the following course twice:		8

INFO 7990	Thesis	

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

Concentration in General Information Systems

Code	Title	Hours

Complete 16 semester hours from any of the courses listed below:

CSYE 6225	Network Structures and Cloud Computing (Big Data Systems and Analytics)	
CSYE 7280	User Experience Design and Testing	
DAMG 7245	Big-Data Systems and Intelligence Analytics	
INFO 6150	Web Design and User Experience Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6350	Smartphones-Based Web Development	
INFO 7250	Engineering of Big-Data Systems	
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications	
INFO 7390	Advances in Data Sciences and Architecture	
INFO 7500	Cryptocurrency and Smart Contract Engineering	
INFO 7510	Smart Contract Application Engineering and Development	
INFO 7520	Engineering of Advanced Cryptocurrency Systems	
INFO 7525	Regulatory Aspects of Smart Contract Automation	

INFO 7535	Digital Smart Contracts Product Innovations
INFO 7610	Special Topics in Natural Language Engineering Methods and Tools

Electives

Code	Title	Hours
Complete the remaining minimum program required semester hours from the following:		
CSYE 6225	Network Structures and Cloud Computing	
CSYE 7105	High-Performance Parallel Machine Learning and AI	
CSYE 7280	User Experience Design and Testing	
CSYE 7374	Special Topics in Computer Systems Engineering	
DAMG 6105	Data Science Engineering with Python	
DAMG 6210	Data Management and Database Design	
DAMG 7245	Big-Data Systems and Intelligence Analytics	
DAMG 7275	Advanced Database Management Systems	
DAMG 7350	Systems and Cybersecurity Fundamentals	
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	
INFO 6105	Data Science Engineering Methods and Tools	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6250 and INFO 6251	Web Development Tools and Methods and Lab for INFO 6250	
INFO 6255	Software Quality Control and Management	
INFO 6350	Smartphones-Based Web Development	
INFO 7110	High-Performance Coding for Fintech	
INFO 7225	Accounting and Budgetary Systems for Engineers	
INFO 7245	Agile Software Development	
INFO 7250	Engineering of Big-Data Systems	
INFO 7255	Advanced Big-Data Applications and Indexing Techniques	
INFO 7285	Organizational Change and IT	
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications	
INFO 7385	Managerial Communications for Engineers	
INFO 7390	Advances in Data Sciences and Architecture	
INFO 7500	Cryptocurrency and Smart Contract Engineering	
INFO 7510	Smart Contract Application Engineering and Development	
INFO 7520	Engineering of Advanced Cryptocurrency Systems	
INFO 7525	Regulatory Aspects of Smart Contract Automation	
INFO 7535	Digital Smart Contracts Product Innovations	
INFO 7610	Special Topics in Natural Language Engineering Methods and Tools	

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6000 to qualify for co-op experience:		
ENCP 6000	Career Management for Engineers	1

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Information Systems—Online, MSIS

The Online Master of Science in Information Systems from the College of Engineering at Northeastern University is designed to teach students to use technology to address the challenges facing people in businesses, organizations, and communities across the world.

The online MSIS offers you an opportunity to obtain the technical skills and business management expertise to drive digital transformation in any organization. You'll study deep applied knowledge across a range of technological fields, including UX design, software development, data analytics, and digital business processes.

If you desire, you may choose to follow a curated Focus Areas in Cyber and Information Security; Product Management & DevOps Leadership; and Software Testing and Quality Assurance. These courses have been selected to ensure that you have the skills you need to enter the workforce in these critical and growing areas.

Along the way, you'll have an opportunity to learn business leadership best practices. With a strong working knowledge of quality assurance, data management, agile methodologies, and marketing assessment, you'll be ready for leadership in almost any organization or industry.

With this unique and flexible set of must-have skills, you'll be ideally positioned to step into a diverse range of tech leadership roles including IT project manager, systems administrator, software developer, information security analyst, and more.

Program Requirements

Complete all core and elective requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Electives

Code	Title	Hours
Complete 28 semester hours from the following:		28
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6255	Software Testing for Engineers	
CSYE 7280	User Experience Design and Testing	
CSYE 7400	Responsible Software Engineering and AI	
DAMG 6210	Data Management and Database Design	
DAMG 7330	Cybersecurity Audit and Compliance	
DAMG 7350	Systems and Cybersecurity Fundamentals	
INFO 6105	Data Science Engineering Methods and Tools	
INFO 6150	Web Design and User Experience Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6255	Software Quality Control and Management	
INFO 6350	Smartphones-Based Web Development	
INFO 7245	Agile Software Development	
INFO 7260	Business Process Engineering	
TELE 5600	Linux/UNIX Systems Management for Network Engineers	
TELE 6300	Communication and Network Security	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Sample Plans of Study

CYBER AND INFORMATION SECURITY FOCUS AREA

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
INFO 5100		4 CSYE 7400		4 TELE 6300	4
INFO 5101		0 CSYE 6225		4 DAMG 7350	4
DAMG 6210		4 TELE 5600		4 DAMG 7370	4
		8		12	12

Total Hours: 32

SOFTWARE TESTING & QUALITY ASSURANCE FOCUS AREA

Year 1				
Fall	Hours	Spring	Hours	
INFO 5100		4 CSYE 7400		4
INFO 5101		0 DAMG 6210		4
INFO 6205		4		
		8		8
Year 2				
Fall	Hours	Spring	Hours	
INFO 6245		4 INFO 6255		4
CSYE 6255		4 CSYE 6225		4
		8		8
Total Hours: 32				

PRODUCT MANAGEMENT & DEVOPS LEADERSHIP FOCUS AREA

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
INFO 5100		4 CSYE 7400		4 CSYE 7280	4
INFO 5101		0 INFO 6245		4 INFO 7260	4
INFO 7245		4			
		8		8	8
Year 2					
Fall	Hours				
INFO 6150		4			
INFO 6255		4			
		8			
Total Hours: 32					

Information Systems, MSIS—Bridge (Arlington)

The Master of Science in Information Systems—Bridge (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy-bridge/>) (MSIS-Bridge) addresses the needs of the digital revolution by preparing students with non-STEM, nontechnical bachelor's degrees to become information systems professionals. MSIS-Bridge students are the link between business users and technologists. As industries launch into a digitized future, professionals with a clear understanding of how technology can be used to address significant societal challenges are in demand. The MSIS-Bridge program closes the gaps between business management, software engineering, and information technology to help students solve complex real-world issues in business and society. It also upskills and reskills to help individuals or businesses identify organizational skills gaps and create a tactical training plan to fill them with new skills and knowledge. Through specially created and selected core courses, students gain the engineering foundation needed to excel in the classroom and in the IT sector.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5001	Application Modeling and Design	4
INFO 5002	Introduction to Python for Information Systems	4
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Restricted Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	

INFO 6245	Planning and Managing Information Systems Development
INFO 7245	Agile Software Development
INFO 7385	Managerial Communications for Engineers

Electives

Code	Title	Hours
Complete 16 SH from the Electives list for this program below. (p. 709)		

Program Credit/GPA Requirements

40 total semester hours required
Minimum 3.000 GPA required

Electives

Code	Title	Hours
CSYE 6202	Concepts of Object-Oriented Design with C#	
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 6220	Enterprise Software Design	
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	
CSYE 6305	Introduction to Quantum Computing with Applications	
CSYE 6700	Technical Writing and Professional Development	
CSYE 7105	High-Performance Parallel Machine Learning and AI	
CSYE 7125	Advanced Cloud Computing	
CSYE 7200	Big-Data System Engineering Using Scala	
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	
CSYE 7220	Deployment and Operation of Software Applications	
CSYE 7230	Software Engineering	
CSYE 7270	Building Virtual Environments	
CSYE 7374	Special Topics in Computer Systems Engineering	
CSYE 7470	Advanced Game Analytics	
CSYE 7550	Distributed Intelligent Agents in the Metaverse	
CSYE 7990	Thesis	
DAMG 6105	Data Science Engineering with Python	
DAMG 6210	Data Management and Database Design	
DAMG 7105	Intelligent Data Modeling and Presentation for Engineers	
DAMG 7245	Big-Data Systems and Intelligence Analytics	
DAMG 7250	Big Data Architecture and Governance	
DAMG 7275	Advanced Database Management Systems	
DAMG 7325	Introduction to Information Technology Auditing	
DAMG 7350	Systems and Cybersecurity Fundamentals	
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	
DAMG 7374	Special Topics in Data Architecture and Management	
INFO 6105	Data Science Engineering Methods and Tools	
INFO 6106	Neural Modeling Methods and Tools	
INFO 6250 and INFO 6251	Web Development Tools and Methods and Lab for INFO 6250	
INFO 6255	Software Quality Control and Management	
INFO 6350	Smartphones-Based Web Development	
INFO 6660	Business Ethics and Intellectual Property for Engineers	
INFO 7110	High-Performance Coding for Fintech	
INFO 7205	Advanced Application Engineering Project	
INFO 7225	Accounting and Budgetary Systems for Engineers	
INFO 7260	Business Process Engineering	

INFO 7330	Information Systems for Healthcare Services Delivery
INFO 7374	Special Topics in Information Systems
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications
INFO 7385	Managerial Communications for Engineers
INFO 7390	Advances in Data Sciences and Architecture
INFO 7405	Advances in Engineering Medical Information Systems
INFO 7510	Smart Contract Application Engineering and Development
INFO 7520	Engineering of Advanced Cryptocurrency Systems
INFO 7525	Regulatory Aspects of Smart Contract Automation
INFO 7535	Digital Smart Contracts Product Innovations
INFO 7610	Special Topics in Natural Language Engineering Methods and Tools
INFO 7990	Thesis

Information Systems, MSIS—Bridge (Boston)

The Master of Science in Information Systems—Bridge (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy-bridge/>) addresses the needs of the digital revolution by preparing students with non-STEM, nontechnical bachelor's degrees to become information systems professionals. MSIS—Bridge students are the link between business users and technologists. As industries launch into a digitized future, professionals with a clear understanding of how technology can be used to address significant societal challenges are in demand. The MSIS—Bridge program closes the gaps between business management, software engineering, and information technology to help students solve complex real-world issues in business and society. It also upskills and reskills to help individuals or businesses identify organizational skills gaps and create a tactical training plan to fill them with new skills and knowledge. Through specially created and selected core courses, students gain the engineering foundation needed to excel in the classroom and in the IT sector.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5001	Application Modeling and Design	4
INFO 5002	Introduction to Python for Information Systems	4
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Restricted Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
DAMG 6210	Data Management and Database Design	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6255	Software Quality Control and Management	
INFO 6350	Smartphones-Based Web Development	
INFO 7245	Agile Software Development	
INFO 7385	Managerial Communications for Engineers	

Electives

Code	Title	Hours
Complete 16 semester hours from the following subject codes:		16
CSYE (except CSYE 6220)		
DAMG		
INFO		
TELE		

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6000 to qualify for co-op experience):		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

40 total semester hours required (41 with optional co-op)

Minimum 3.000 GPA required

Information Systems, MSIS—Bridge (Miami)

The Master of Science in Information Systems—Bridge (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy-bridge/>) (MSIS-Bridge) addresses the needs of the digital revolution by preparing students with non-STEM, nontechnical bachelor's degrees to become information systems professionals. MSIS-Bridge students are the link between business users and technologists. As industries launch into a digitized future, professionals with a clear understanding of how technology can be used to address significant societal challenges are in demand. The MSIS-Bridge program closes the gaps between business management, software engineering, and information technology to help students solve complex real-world issues in business and society. It also upskills and reskills to help individuals or businesses identify organizational skills gaps and create a tactical training plan to fill them with new skills and knowledge. Through specially created and selected core courses, students gain the engineering foundation needed to excel in the classroom and in the IT sector.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5001	Application Modeling and Design	4
INFO 5002	Introduction to Python for Information Systems	4
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Restricted Electives

Code	Title	Hours
Complete 28 semester hours from the following:		28
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6202	Concepts of Object-Oriented Design with C#	
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	
CSYE 6305	Introduction to Quantum Computing with Applications	
CSYE 6700	Technical Writing and Professional Development	
CSYE 7105	High-Performance Parallel Machine Learning and AI	
CSYE 7125	Advanced Cloud Computing	
CSYE 7200	Big-Data System Engineering Using Scala	
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	
CSYE 7220	Deployment and Operation of Software Applications	
CSYE 7230	Software Engineering	
CSYE 7235	Model-Driven Architecture	
CSYE 7270	Building Virtual Environments	
CSYE 7370	Deep Learning and Reinforcement Learning in Game Engineering	
CSYE 7374	Special Topics in Computer Systems Engineering	
CSYE 7470	Advanced Game Analytics	
CSYE 7550	Distributed Intelligent Agents in the Metaverse	

CSYE 7990	Thesis
DAMG 6105	Data Science Engineering with Python
DAMG 6210	Data Management and Database Design
DAMG 7250	Big Data Architecture and Governance
DAMG 7275	Advanced Database Management Systems
DAMG 7325	Introduction to Information Technology Auditing
DAMG 7350	Systems and Cybersecurity Fundamentals
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence
DAMG 7374	Special Topics in Data Architecture and Management
DAMG 7390	Advances in Hybrid Data Integration and Engineering
INFO 6105	Data Science Engineering Methods and Tools
INFO 6106	Neural Modeling Methods and Tools
INFO 6150	Web Design and User Experience Engineering
INFO 6205	Program Structure and Algorithms
INFO 6215	Business Analysis and Information Engineering
INFO 6245	Planning and Managing Information Systems Development
INFO 6250 and INFO 6251	Web Development Tools and Methods and Lab for INFO 6250
INFO 6255	Software Quality Control and Management
INFO 6660	Business Ethics and Intellectual Property for Engineers
INFO 7110	High-Performance Coding for Fintech
INFO 7205	Advanced Application Engineering Project
INFO 7225	Accounting and Budgetary Systems for Engineers
INFO 7245	Agile Software Development
INFO 7255	Advanced Big-Data Applications and Indexing Techniques
INFO 7260	Business Process Engineering
INFO 7285	Organizational Change and IT
INFO 7330	Information Systems for Healthcare Services Delivery
INFO 7374	Special Topics in Information Systems
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications
INFO 7385	Managerial Communications for Engineers
INFO 7405	Advances in Engineering Medical Information Systems
INFO 7990	Thesis
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330
TELE 5340	Telecommunications Public Policy and Business Management
TELE 5350	Telecom and Network Infrastructure
TELE 5360	Internet Protocols and Architecture
TELE 5600	Linux/UNIX Systems Management for Network Engineers
TELE 5976	Directed Study
TELE 6350	Unified Communications and Collaboration
TELE 6400	Software-Defined Networking
TELE 6420	Infrastructure Automation Design and Tools
TELE 6510	Fundamentals of the Internet of Things
TELE 6530	Connected Devices
TELE 7374	Special Topics in the Internet of Things
TELE 7945	Master's Project

Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

Information Systems, MSIS—Bridge (Oakland)

The Master of Science in Information Systems—Bridge (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy-bridge/>) (MSIS-Bridge) addresses the needs of the digital revolution by preparing students with non-STEM, nontechnical bachelor's degrees to become information systems professionals. MSIS-Bridge students are the link between business users and technologists. As industries launch into a digitized future, professionals with a clear understanding of how technology can be used to address significant societal challenges are in demand. The MSIS-Bridge program closes the gaps between business management, software engineering, and information technology to help students solve complex real-world issues in business and society. It also upskills and reskills to help individuals or businesses identify organizational skills gaps and create a tactical training plan to fill them with new skills and knowledge. Through specially created and selected core courses, students gain the engineering foundation needed to excel in the classroom and in the IT sector.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5001	Application Modeling and Design	4
INFO 5002	Introduction to Python for Information Systems	4
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Restricted Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
DAMG 6210	Data Management and Database Design	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6255	Software Quality Control and Management	
INFO 6350	Smartphones-Based Web Development	
INFO 7245	Agile Software Development	
INFO 7385	Managerial Communications for Engineers	

Electives

Code	Title	Hours
Complete 16 semester hours from the following subject codes:		16
CSYE (except CSYE 6220)		
DAMG		
INFO		
TELE		

Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

Information Systems, MSIS—Bridge (Portland)

The Master of Science in Information Systems—Bridge (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy-bridge/>) addresses the needs of the digital revolution by preparing students with non-STEM, nontechnical bachelor's degrees to become information systems professionals. MSIS-Bridge students are the link between business users and technologists. As industries launch into a digitized future, professionals with a clear understanding of how technology can be used to address significant societal challenges are in demand. The MSIS-Bridge program closes the gaps between business management, software engineering, and information technology to help students solve complex real-world issues in business and society. It also upskills and reskills to help individuals or businesses identify organizational skills gaps and create a tactical training plan to fill them with new skills and knowledge. Through specially created and selected core courses, students gain the engineering foundation needed to excel in the classroom and in the IT sector.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5001	Application Modeling and Design	4
INFO 5002	Introduction to Python for Information Systems	4
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Restricted Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
DAMG 6210	Data Management and Database Design	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6255	Software Quality Control and Management	
INFO 6350	Smartphones-Based Web Development	
INFO 7245	Agile Software Development	
INFO 7385	Managerial Communications for Engineers	

Electives

Code	Title	Hours
Complete 16 semester hours from the following subject codes:		16
CSYE (except CSYE 6220)		
DAMG		
INFO		
TELE		

Optional Co-Op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6000 to qualify for co-op experience:		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

40 total semester hours required (41 with optional co-op)

Minimum 3.000 GPA required

Information Systems, MSIS—Bridge (Seattle)

The Master of Science in Information Systems—Bridge (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy-bridge/>) (MSIS-Bridge) addresses the needs of the digital revolution by preparing students with non-STEM, nontechnical bachelor's degrees to become information systems professionals. MSIS-Bridge students are the link between business users and technologists. As industries launch into a digitized future, professionals with a clear understanding of how technology can be used to address significant societal challenges are in demand. The MSIS-Bridge program closes the gaps between business management, software engineering, and information technology to help students solve complex real-world issues in business and society. It also upskills and reskills to help individuals or businesses identify organizational skills gaps and create a tactical training plan to fill them with new skills and knowledge. Through specially created and selected core courses, students gain the engineering foundation needed to excel in the classroom and in the IT sector.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5001	Application Modeling and Design	4
INFO 5002	Introduction to Python for Information Systems	4
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Restricted Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
DAMG 6210	Data Management and Database Design	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6255	Software Quality Control and Management	
INFO 6350	Smartphones-Based Web Development	
INFO 7245	Agile Software Development	
INFO 7385	Managerial Communications for Engineers	

Electives

Code	Title	Hours
Complete 16 semester hours from the following:		16
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	
CSYE 6305	Introduction to Quantum Computing with Applications	
CSYE 7230	Software Engineering	
CSYE 7280	User Experience Design and Testing	
CSYE 7374	Special Topics in Computer Systems Engineering	
CSYE 7380	Theory and Practical Applications of AI Generative Modeling	
DAMG 6105	Data Science Engineering with Python	
DAMG 7245	Big-Data Systems and Intelligence Analytics	
DAMG 7250	Big Data Architecture and Governance	
DAMG 7275	Advanced Database Management Systems	
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	
DAMG 7374	Special Topics in Data Architecture and Management	
ENCP 6000	Career Management for Engineers	
INFO 6105	Data Science Engineering Methods and Tools	
INFO 6250 and INFO 6251	Web Development Tools and Methods and Lab for INFO 6250	
INFO 6660	Business Ethics and Intellectual Property for Engineers	
INFO 7225	Accounting and Budgetary Systems for Engineers	
INFO 7250	Engineering of Big-Data Systems	
INFO 7255	Advanced Big-Data Applications and Indexing Techniques	
INFO 7260	Business Process Engineering	
INFO 7285	Organizational Change and IT	
INFO 7374	Special Topics in Information Systems	
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications	
INFO 7380	User Experience Design for Healthcare Applications	
INFO 7390	Advances in Data Sciences and Architecture	
INFO 7500	Cryptocurrency and Smart Contract Engineering	
INFO 7510	Smart Contract Application Engineering and Development	
INFO 7610	Special Topics in Natural Language Engineering Methods and Tools	

INFO 7945	Master's Project
INFO 7990	Thesis
INFO 7976	Directed Study

Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

Information Systems, MSIS—Bridge (Silicon Valley)

The Master of Science in Information Systems—Bridge (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy-bridge/>) (MSIS-Bridge) addresses the needs of the digital revolution by preparing students with non-STEM, nontechnical bachelor's degrees to become information systems professionals. MSIS-Bridge students are the link between business users and technologists. As industries launch into a digitized future, professionals with a clear understanding of how technology can be used to address significant societal challenges are in demand. The MSIS-Bridge program closes the gaps between business management, software engineering, and information technology to help students solve complex real-world issues in business and society. It also upskills and reskills to help individuals or businesses identify organizational skills gaps and create a tactical training plan to fill them with new skills and knowledge. Through specially created and selected core courses, students gain the engineering foundation needed to excel in the classroom and in the IT sector.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5001	Application Modeling and Design	4
INFO 5002	Introduction to Python for Information Systems	4
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Restricted Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
DAMG 6210	Data Management and Database Design	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6255	Software Quality Control and Management	
INFO 6350	Smartphones-Based Web Development	
INFO 7245	Agile Software Development	
INFO 7385	Managerial Communications for Engineers	

Electives

Code	Title	Hours
Complete 16 semester hours from the following subject codes:		16
CSYE (except CSYE 6220)		
DAMG		
INFO		
TELE		

Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

Information Systems, MSIS—Bridge (Toronto)

The Master of Science in Information Systems—Bridge (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy-bridge/>) (MSIS-Bridge) addresses the needs of the digital revolution by preparing students with non-STEM, nontechnical bachelor's degrees

to become information systems professionals. MSIS-Bridge students are the link between business users and technologists. As industries launch into a digitized future, professionals with a clear understanding of how technology can be used to address significant societal challenges are in demand. The MSIS-Bridge program closes the gaps between business management, software engineering, and information technology to help students solve complex real-world issues in business and society. It also upskills and reskills to help individuals or businesses identify organizational skills gaps and create a tactical training plan to fill them with new skills and knowledge. Through specially created and selected core courses, students gain the engineering foundation needed to excel in the classroom and in the IT sector.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INFO 5001	Application Modeling and Design	4
INFO 5002	Introduction to Python for Information Systems	4
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Options

Complete one of the following options:

PROJECT OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
Complete a minimum of 12 semester hours from the Restricted Electives course list below. (p. 717)		12
Complete the remaining 12 semester hours from the Restricted Electives or the Electives course list below. (p. 717)		12

THESIS OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
INFO 7990	Thesis	4
Complete a minimum of 12 semester hours from the Restricted Electives course list below. (p. 717)		12
Complete the remaining 8 semester hours from the Restricted Electives or the Electives course list below. (p. 717)		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Restricted Electives

Code	Title	Hours
DAMG 6210	Data Management and Database Design	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6255	Software Quality Control and Management	
INFO 6350	Smartphones-Based Web Development	
INFO 7245	Agile Software Development	
INFO 7385	Managerial Communications for Engineers	

Electives

Code	Title	Hours
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	
CSYE 6305	Introduction to Quantum Computing with Applications	
CSYE 7105	High-Performance Parallel Machine Learning and AI	
CSYE 7125	Advanced Cloud Computing	
CSYE 7200	Big-Data System Engineering Using Scala	
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	

CSYE 7220	Deployment and Operation of Software Applications
CSYE 7230	Software Engineering
CSYE 7235	Model-Driven Architecture
CSYE 7270	Building Virtual Environments
CSYE 7280	User Experience Design and Testing
CSYE 7374	Special Topics in Computer Systems Engineering
CSYE 7380	Theory and Practical Applications of AI Generative Modeling
DAMG 6105	Data Science Engineering with Python
DAMG 6210	Data Management and Database Design
DAMG 7245	Big-Data Systems and Intelligence Analytics
DAMG 7250	Big Data Architecture and Governance
DAMG 7275	Advanced Database Management Systems
DAMG 7350	Systems and Cybersecurity Fundamentals
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence
DAMG 7374	Special Topics in Data Architecture and Management
INFO 6105	Data Science Engineering Methods and Tools
INFO 6106	Neural Modeling Methods and Tools
INFO 6150	Web Design and User Experience Engineering
INFO 6205	Program Structure and Algorithms
INFO 6215	Business Analysis and Information Engineering
INFO 6245	Planning and Managing Information Systems Development
INFO 6250 and INFO 6251	Web Development Tools and Methods and Lab for INFO 6250
INFO 6255	Software Quality Control and Management
INFO 6350	Smartphones-Based Web Development
INFO 6660	Business Ethics and Intellectual Property for Engineers
INFO 7110	High-Performance Coding for Fintech
INFO 7225	Accounting and Budgetary Systems for Engineers
INFO 7245	Agile Software Development
INFO 7250	Engineering of Big-Data Systems
INFO 7255	Advanced Big-Data Applications and Indexing Techniques
INFO 7260	Business Process Engineering
INFO 7285	Organizational Change and IT
INFO 7374	Special Topics in Information Systems
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications
INFO 7380	User Experience Design for Healthcare Applications
INFO 7385	Managerial Communications for Engineers
INFO 7390	Advances in Data Sciences and Architecture
INFO 7405	Advances in Engineering Medical Information Systems
INFO 7410	Advanced Medical Device Software Engineering
INFO 7500	Cryptocurrency and Smart Contract Engineering
INFO 7510	Smart Contract Application Engineering and Development
INFO 7520	Engineering of Advanced Cryptocurrency Systems
INFO 7525	Regulatory Aspects of Smart Contract Automation
INFO 7535	Digital Smart Contracts Product Innovations
INFO 7610	Special Topics in Natural Language Engineering Methods and Tools
INFO 7976	Directed Study
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330
TELE 5350	Telecom and Network Infrastructure
TELE 5360	Internet Protocols and Architecture
TELE 5600	Linux/UNIX Systems Management for Network Engineers
TELE 6300	Communication and Network Security
TELE 6400	Software-Defined Networking

TELE 6420	Infrastructure Automation Design and Tools
TELE 6500	Machine Learning for IoT Systems
TELE 6510	Fundamentals of the Internet of Things
TELE 6530	Connected Devices
TELE 6550	IoT Embedded System Design
TELE 7374	Special Topics in the Internet of Things

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6000 to qualify for co-op experience:		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

40 total semester hours required (41 with optional co-op)

Minimum 3.000 GPA required

MSIS-INSY-B : Information Systems, MSIS—Bridge (Vancouver)

The Master of Science in Information Systems—Bridge (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy-bridge/>) (MSIS-Bridge) addresses the needs of the digital revolution by preparing students with non-STEM, nontechnical bachelor's degrees to become information systems professionals. MSIS-Bridge students are the link between business users and technologists. As industries launch into a digitized future, professionals with a clear understanding of how technology can be used to address significant societal challenges are in demand. The MSIS-Bridge program closes the gaps between business management, software engineering, and information technology to help students solve complex real-world issues in business and society. It also upskills and reskills to help individuals or businesses identify organizational skills gaps and create a tactical training plan to fill them with new skills and knowledge. Through specially created and selected core courses, students gain the engineering foundation needed to excel in the classroom and in the IT sector.

Program Requirements

Bridge Coursework

Code	Title	Hours
INFO 5001	Application Modeling and Design	4
INFO 5002	Introduction to Python for Information Systems	4

Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Project or Thesis Options

Complete one of the following options:

PROJECT OPTION

Code	Title	Hours
INFO 7976	Directed Study	4

THESIS OPTION

Code	Title	Hours
Complete the following course twice:		8
INFO 7990	Thesis	

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

General Information Systems Concentration

Code	Title	Hours
Complete 16 semester hours from any of the courses listed below:		16
CSYE 6225	Network Structures and Cloud Computing	
CSYE 7280	User Experience Design and Testing	
DAMG 7245	Big-Data Systems and Intelligence Analytics	
INFO 6150	Web Design and User Experience Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6350	Smartphones-Based Web Development	
INFO 7250	Engineering of Big-Data Systems	
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications	
INFO 7390	Advances in Data Sciences and Architecture	
INFO 7500	Cryptocurrency and Smart Contract Engineering	
INFO 7510	Smart Contract Application Engineering and Development	
INFO 7520	Engineering of Advanced Cryptocurrency Systems	
INFO 7525	Regulatory Aspects of Smart Contract Automation	
INFO 7535	Digital Smart Contracts Product Innovations	
INFO 7610	Special Topics in Natural Language Engineering Methods and Tools	

Electives

Code	Title	Hours
Complete the remaining semester hours from the following:		
CSYE 6225	Network Structures and Cloud Computing	
CSYE 7105	High-Performance Parallel Machine Learning and AI	
CSYE 7280	User Experience Design and Testing	
CSYE 7374	Special Topics in Computer Systems Engineering	
DAMG 6105	Data Science Engineering with Python	
DAMG 6210	Data Management and Database Design	
DAMG 7245	Big-Data Systems and Intelligence Analytics	
DAMG 7275	Advanced Database Management Systems	
DAMG 7350	Systems and Cybersecurity Fundamentals	
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	
INFO 6105	Data Science Engineering Methods and Tools	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6250 and INFO 6251	Web Development Tools and Methods and Lab for INFO 6250	
INFO 6255	Software Quality Control and Management	
INFO 6350	Smartphones-Based Web Development	
INFO 7110	High-Performance Coding for Fintech	
INFO 7225	Accounting and Budgetary Systems for Engineers	
INFO 7245	Agile Software Development	
INFO 7250	Engineering of Big-Data Systems	
INFO 7255	Advanced Big-Data Applications and Indexing Techniques	
INFO 7285	Organizational Change and IT	
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications	
INFO 7385	Managerial Communications for Engineers	
INFO 7390	Advances in Data Sciences and Architecture	
INFO 7500	Cryptocurrency and Smart Contract Engineering	
INFO 7510	Smart Contract Application Engineering and Development	
INFO 7520	Engineering of Advanced Cryptocurrency Systems	
INFO 7525	Regulatory Aspects of Smart Contract Automation	

INFO 7535

Digital Smart Contracts Product Innovations

INFO 7610

Special Topics in Natural Language Engineering Methods and Tools

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6000 to qualify for co-op experience:		
ENCP 6000	Career Management for Engineers	1

Program Credit/GPA Requirements

40 total semester hours required (41 with optional co-op)

Minimum 3.000 GPA required

Information Systems, MSIS—Bridge—Online

The Online Master of Science in Information Systems—Bridge from the College of Engineering at Northeastern University is designed to teach students to use technology to address the challenges facing people in businesses, organizations, and communities across the world. This prestigious and meticulously designed master's program allows capable graduates from all academic and professional backgrounds to reposition themselves across a range of rapidly growing IT industries, ready to help define and lead the systemic changes that are reshaping our societies.

Designed for graduates and working professionals from any background, the online MSIS offers you an opportunity to obtain the technical skills and business management expertise to drive digital transformation in any organization. You'll study deep applied knowledge across a range of technological fields, including UX design, software development, data analytics, and digital business processes.

Along the way, you'll have an opportunity to learn business leadership best practices. With a strong working knowledge of quality assurance, data management, agile methodologies, and marketing assessment, you'll be ready for leadership in almost any organization or industry.

With this unique and flexible set of must-have skills, you'll be ideally positioned to step into a diverse range of tech leadership roles including IT project manager, systems administrator, software developer, information security analyst, and more.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Introductory Coursework

Note: To ensure that students have the foundation necessary to be successful in this program, each student must complete the following with a minimum grade of B:

Code	Title	Hours
INFO 5001	Application Modeling and Design	4
INFO 5002	Introduction to Python for Information Systems	4

Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

Additional Requirements

Code	Title	Hours
CSYE 7280	User Experience Design and Testing	4
DAMG 6210	Data Management and Database Design	4
INFO 6105	Data Science Engineering Methods and Tools	4
INFO 6150	Web Design and User Experience Engineering	4
INFO 6245	Planning and Managing Information Systems Development	4
INFO 6350	Smartphones-Based Web Development	4
INFO 7245	Agile Software Development	4

Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

Cyber-Physical Systems, MS (Boston)

The Master of Science in Cyber-Physical Systems (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-cyps/>) with a concentration in the Internet of Things is designed to prepare our graduates for a world of connected devices. This innovative multidisciplinary program is designed to meet the demand for a new kind of specialist—one who can engineer and develop new interactive services; acquire, fuse, and process the data collected from sensors, actuators, controllers, and other devices; and develop architectures to interconnect these elements as part of larger, more diverse systems. It is expected that careers in this rapidly evolving area will encompass industry sectors ranging from energy, healthcare, transportation, and infrastructure to manufacturing.

This program integrates the study of wireless networking, protocols, sensor networks, security, software development, embedded systems, data analytics, and Big Data to provide students with the knowledge and tools to develop IoT applications, to analyze and design IoT architectures for different application domains, and to develop data analytic tools to analyze the large amounts of data generated by the massive deployment of IoT devices.

Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any one of the three options: coursework option, project option, and thesis option. Specific degree requirements for each of these options can be found under the Program Requirements tab. Although there are some dependencies among the core courses, the program may be started in either the fall or spring semester.

Master's Project and Thesis options must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a Master's Project or a Thesis need to be submitted at least one month before the start of the semester.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
TELE 6510	Fundamentals of the Internet of Things	4
TELE 6530	Connected Devices	4
Complete two of the following:		8
CSYE 6200	Concepts of Object-Oriented Design	
TELE 6500	Machine Learning for IoT Systems	
TELE 6550	IoT Embedded System Design	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the electives course list below.		16

PROJECT OPTION

Code	Title	Hours
TELE 7945	Master's Project	4
Complete 12 semester hours from the electives course list below.		12

THESIS OPTION

Code	Title	Hours
TELE 7945	Master's Project	4
TELE 7990	Thesis	4
Complete 8 semester hours from the electives course list below.		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Electives

Code	Title	Hours
Complete courses from any of the following subject codes:		
CSYE		
DAMG		
INFO		
TELE		

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6000 to qualify for co-op experience:		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Cyber-Physical Systems, MS (Toronto)

The Master of Science in Cyber-Physical Systems (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-cyps/>) with a concentration in the Internet of Things is designed to prepare our graduates for a world of connected devices. This innovative multidisciplinary program is designed to meet the demand for a new kind of specialist—one who can engineer and develop new interactive services; acquire, fuse, and process the data collected from sensors, actuators, controllers, and other devices; and develop architectures to interconnect these elements as part of larger, more diverse systems. It is expected that careers in this rapidly evolving area will encompass industry sectors ranging from energy, healthcare, transportation, and infrastructure to manufacturing.

This program integrates the study of wireless networking, protocols, sensor networks, security, software development, embedded systems, data analytics, and Big Data to provide students with the knowledge and tools to develop IoT applications, to analyze and design IoT architectures for different application domains, and to develop data analytic tools to analyze the large amounts of data generated by the massive deployment of IoT devices.

Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing the project option.

The Master's Project option must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a Master's Project need to be submitted at least one month before the start of the semester.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
TELE 6510	Fundamentals of the Internet of Things	4
TELE 6530	Connected Devices	4
TELE 7945	Master's Project	4
Complete two out of the following three:		8
CSYE 6200	Concepts of Object-Oriented Design	
or INFO 5100	Application Engineering and Development	
and INFO 5101	and Lab for INFO 5100	
TELE 6500	Machine Learning for IoT Systems	

or INFO 6150	Web Design and User Experience Engineering
TELE 6550	IoT Embedded System Design

Electives

Code	Title	Hours
Complete 12 semester hours from the following options:		12
CSYE 6225	Network Structures and Cloud Computing	
CSYE 7230	Software Engineering	
CSYE 7280	User Experience Design and Testing	
DAMG 6210	Data Management and Database Design	
DAMG 7275	Advanced Database Management Systems	
INFO 6205	Program Structure and Algorithms	
INFO 6250 and INFO 6251	Web Development Tools and Methods and Lab for INFO 6250	
INFO 6660	Business Ethics and Intellectual Property for Engineers	
INFO 7390	Advances in Data Sciences and Architecture	
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	
TELE 5360	Internet Protocols and Architecture	
TELE 7374	Special Topics in the Internet of Things	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Data Architecture and Management, MS (Boston)

For program contact information, please visit this website (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-daam/>).

Many MS programs in the data area deal with data collection and analysis but do not, however, address a crucial activity that data scientists, data analysts, business analysts, and many software engineers need to perform to make that data valuable—data integration. That activity may also be referred to as data preparation, data curation, application integration, and data engineering based on the integration of use cases and integration persona. The Master of Science in Data Architecture and Management focuses on these activities.

Data systems engineering occurs because data is fragmented and usually scattered across many data sources. However, even if all the data one needed were in one place, there is still an intensive need for integration. Information is data in context and the context of data as collected is different than the many ways it needs to be transformed so as to generate useful information.

The data engineering field could be thought of as a superset of business intelligence and data warehousing that brings in more elements from software engineering. This discipline also integrates specialization around the operation of so-called Big Data distributed systems, along with concepts around the extended Hadoop ecosystem, stream processing, and in computation at scale.

The Master of Science in Data Architecture and Management offers a multitude of courses in data engineering in addition to supplementary courses that are required to deliver the data results in a meaningful way to management. We plan to cover data management, advanced data management, data warehousing and business intelligence, column databases, data science engineering, and Big Data engineering. On the software engineering side, we offer advanced Big Data programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multithread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large-scale analytics to make things run faster by hundredfold increases in speed. Due to the high-level mathematical operations required to make these programs run, only software engineers can make the necessary mathematical algorithms execute quickly enough to work in these complicated areas and get the finest results.

Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three options: coursework, project, or thesis.

Master's project and thesis options must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a master's project or a thesis need to be submitted at least one month before the start of the semester.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
DAMG 6105	Data Science Engineering with Python	4
DAMG 6210	Data Management and Database Design	4
DAMG 7250	Big Data Architecture and Governance	4
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the electives course list below.		16

PROJECT OPTION

Code	Title	Hours
DAMG 7945	Master's Project	4
Complete 12 semester hours from the electives course list below.		12

THESIS OPTION

Code	Title	Hours
DAMG 7945	Master's Project	4
DAMG 7990	Thesis	4
Complete 8 semester hours from the electives course list below.		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Electives

Code	Title	Hours
Complete courses from any of the following subject codes:		
CSYE		
DAMG		
INFO		
TELE		

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6000 to qualify for co-op experience:		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Data Architecture and Management, MS (Seattle)

For program contact information, please visit this website (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-daam/>).

Many MS programs in the data area deal with data collection and analysis but do not, however, address a crucial activity that data scientists, data analysts, business analysts, and many software engineers need to perform to make that data valuable—data integration. That activity may also be referred to as data preparation, data curation, application integration, and data engineering based on the integration of use cases and integration persona. The Master of Science in Data Architecture and Management focuses on these activities.

Data systems engineering occurs because data is fragmented and usually scattered across many data sources. However, even if all the data one needed were in one place, there is still an intensive need for integration. Information is data in context and the context of data as collected is different than the many ways it needs to be transformed so as to generate useful information.

The data engineering field could be thought of as a superset of business intelligence and data warehousing that brings in more elements from software engineering. This discipline also integrates specialization around the operation of so-called Big Data distributed systems, along with concepts around the extended Hadoop ecosystem, stream processing, and in computation at scale.

The Master of Science in Data Architecture and Management offers a multitude of courses in data engineering in addition to supplementary courses that are required to deliver the data results in a meaningful way to management. We plan to cover data management, advanced data management, data warehousing and business intelligence, column databases, data science engineering, and Big Data engineering. On the software engineering side, we offer advanced Big Data programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multithread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large-scale analytics to make things run faster by hundredfold increases in speed. Due to the high-level mathematical operations required to make these programs run, only software engineers can make the necessary mathematical algorithms execute quickly enough to work in these complicated areas and get the finest results.

Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000.

The master's thesis must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a thesis need to be submitted at least one month before the start of the semester.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
DAMG 6105	Data Science Engineering with Python	4
DAMG 6210	Data Management and Database Design	4
DAMG 7250	Big Data Architecture and Governance	4
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	4
Complete 16 semester hours from the electives course list below. (p. 726)		16

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6000 to qualify for co-op experience):		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

ELECTIVES

Code	Title	Hours
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6202	Concepts of Object-Oriented Design with C#	
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	

CSYE 6255	Software Testing for Engineers
CSYE 6305	Introduction to Quantum Computing with Applications
CSYE 6700	Technical Writing and Professional Development
CSYE 7105	High-Performance Parallel Machine Learning and AI
CSYE 7125	Advanced Cloud Computing
CSYE 7200	Big-Data System Engineering Using Scala
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming
CSYE 7220	Deployment and Operation of Software Applications
CSYE 7230	Software Engineering
CSYE 7235	Model-Driven Architecture
CSYE 7270	Building Virtual Environments
CSYE 7280	User Experience Design and Testing
CSYE 7300	Zero Trust Architecture for Software Engineers
CSYE 7370	Deep Learning and Reinforcement Learning in Game Engineering
CSYE 7374	Special Topics in Computer Systems Engineering
CSYE 7400	Responsible Software Engineering and AI
CSYE 7470	Advanced Game Analytics
CSYE 7550	Distributed Intelligent Agents in the Metaverse
CSYE 7380	Theory and Practical Applications of AI Generative Modeling
DAMG 6105	Data Science Engineering with Python
DAMG 6210	Data Management and Database Design
DAMG 7105	Intelligent Data Modeling and Presentation for Engineers
DAMG 7245	Big-Data Systems and Intelligence Analytics
DAMG 7250	Big Data Architecture and Governance
DAMG 7275	Advanced Database Management Systems
DAMG 7325	Introduction to Information Technology Auditing
DAMG 7330	Cybersecurity Audit and Compliance
DAMG 7350	Systems and Cybersecurity Fundamentals
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence
DAMG 7374	Special Topics in Data Architecture and Management
DAMG 7390	Advances in Hybrid Data Integration and Engineering
DAMG 7945	Master's Project
DAMG 7976	Directed Study
DAMG 7990	Thesis
INFO 6105	Data Science Engineering Methods and Tools
INFO 6106	Neural Modeling Methods and Tools
INFO 6150	Web Design and User Experience Engineering
INFO 6205	Program Structure and Algorithms
INFO 6215	Business Analysis and Information Engineering
INFO 6245	Planning and Managing Information Systems Development
INFO 6250 and INFO 6251	Web Development Tools and Methods and Lab for INFO 6250
INFO 6255	Software Quality Control and Management
INFO 6350	Smartphones-Based Web Development
INFO 6500	Managing Operational Risk for Engineering
INFO 6660	Business Ethics and Intellectual Property for Engineers
INFO 7110	High-Performance Coding for Fintech
INFO 7205	Advanced Application Engineering Project
INFO 7225	Accounting and Budgetary Systems for Engineers
INFO 7245	Agile Software Development
INFO 7250	Engineering of Big-Data Systems
INFO 7255	Advanced Big-Data Applications and Indexing Techniques
INFO 7260	Business Process Engineering
INFO 7285	Organizational Change and IT

INFO 7330	Information Systems for Healthcare Services Delivery
INFO 7374	Special Topics in Information Systems
INFO 7375	Special Topics in Artificial Intelligence Engineering and Applications
INFO 7380	User Experience Design for Healthcare Applications
INFO 7385	Managerial Communications for Engineers
INFO 7390	Advances in Data Sciences and Architecture
INFO 7405	Advances in Engineering Medical Information Systems
INFO 7410	Advanced Medical Device Software Engineering
INFO 7500	Cryptocurrency and Smart Contract Engineering
INFO 7510	Smart Contract Application Engineering and Development
INFO 7520	Engineering of Advanced Cryptocurrency Systems
INFO 7525	Regulatory Aspects of Smart Contract Automation
INFO 7535	Digital Smart Contracts Product Innovations
INFO 7610	Special Topics in Natural Language Engineering Methods and Tools
INFO 7750	Engineering Advanced Healthcare Information Exchange Platforms
INFO 7945	Master's Project
INFO 7976	Directed Study
INFO 7990	Thesis
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330
TELE 5350	Telecom and Network Infrastructure
TELE 5360	Internet Protocols and Architecture
TELE 5600	Linux/UNIX Systems Management for Network Engineers
TELE 6300	Communication and Network Security
TELE 6400	Software-Defined Networking
TELE 6420	Infrastructure Automation Design and Tools
TELE 6500	Machine Learning for IoT Systems
TELE 6510	Fundamentals of the Internet of Things
TELE 6530	Connected Devices
TELE 6550	IoT Embedded System Design
TELE 7374	Special Topics in the Internet of Things

Data Architecture and Management, MS (Toronto)

Admissions to this program will open for the 2026-2027 academic year.

For program contact information, please visit this website (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-daam/>).

Many MS programs in the data area deal with data collection and analysis but do not, however, address a crucial activity that data scientists, data analysts, business analysts, and many software engineers need to perform to make that data valuable—data integration. That activity may also be referred to as data preparation, data curation, application integration, and data engineering based on the integration of use cases and integration persona. The Master of Science in Data Architecture and Management focuses on these activities.

Data systems engineering occurs because data is fragmented and usually scattered across many data sources. However, even if all the data one needed were in one place, there is still an intensive need for integration. Information is data in context and the context of data as collected is different than the many ways it needs to be transformed so as to generate useful information.

The data engineering field could be thought of as a superset of business intelligence and data warehousing that brings in more elements from software engineering. This discipline also integrates specialization around the operation of so-called Big Data distributed systems, along with concepts around the extended Hadoop ecosystem, stream processing, and in computation at scale.

The Master of Science in Data Architecture and Management offers a multitude of courses in data engineering in addition to supplementary courses that are required to deliver the data results in a meaningful way to management. We plan to cover data management, advanced data management, data warehousing and business intelligence, column databases, data science engineering, and Big Data engineering. On the software engineering side, we offer advanced Big Data programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multithread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large-scale analytics to make things run faster by hundredfold increases in speed. Due to the high-level mathematical operations required to make these programs

run, only software engineers can make the necessary mathematical algorithms execute quickly enough to work in these complicated areas and get the finest results.

Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000. Students complete a master's degree by pursuing a thesis.

The thesis must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a thesis need to be submitted at least one month before the start of the semester.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
DAMG 6105	Data Science Engineering with Python	4
DAMG 6210	Data Management and Database Design	4
DAMG 7250	Big Data Architecture and Governance	4
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	4

Thesis

Code	Title	Hours
DAMG 7945	Master's Project	4
DAMG 7990	Thesis	4

Complete 8 semester hours from the electives course list below.

8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Electives

Code	Title	Hours
Complete the remaining semester hours from the following electives (in the subject codes CSYE, DAMG and INFO)		8
DAMG 7245	Big-Data Systems and Intelligence Analytics	
DAMG 7275	Advanced Database Management Systems	
DAMG 7350	Systems and Cybersecurity Fundamentals	
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	
DAMG 7374	Special Topics in Data Architecture and Management	
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 6220	Enterprise Software Design	
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	
CSYE 6305	Introduction to Quantum Computing with Applications	
CSYE 7105	High-Performance Parallel Machine Learning and AI	
CSYE 7125	Advanced Cloud Computing	
CSYE 7200	Big-Data System Engineering Using Scala	
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	
CSYE 7220	Deployment and Operation of Software Applications	
CSYE 7230	Software Engineering	
CSYE 7270	Building Virtual Environments	
CSYE 7280	User Experience Design and Testing	
CSYE 7370	Deep Learning and Reinforcement Learning in Game Engineering	
CSYE 7374	Special Topics in Computer Systems Engineering	
CSYE 7470	Advanced Game Analytics	
CSYE 7550	Distributed Intelligent Agents in the Metaverse	
INFO 5100	Application Engineering and Development	
INFO 5101	Lab for INFO 5100	

INFO 6105	Data Science Engineering Methods and Tools
INFO 6150	Web Design and User Experience Engineering
INFO 6205	Program Structure and Algorithms
INFO 6250	Web Development Tools and Methods
INFO 7225	Accounting and Budgetary Systems for Engineers
INFO 7245	Agile Software Development
INFO 7255	Advanced Big-Data Applications and Indexing Techniques
INFO 7260	Business Process Engineering
INFO 7385	Managerial Communications for Engineers
INFO 7390	Advances in Data Sciences and Architecture
INFO 7500	Cryptocurrency and Smart Contract Engineering

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6000 to qualify for co-op experience):		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Software Engineering Systems, MS (Arlington)

Website (<http://www.coe.neu.edu/degrees/ms-cse/>)

The software engineering systems program takes a sociotechnical, engineering approach to software. This engineering foundation is designed to enable students to embrace real-world complexity as a golden opportunity, especially for the more technically advanced student. We are committed to shaping our students to be intuitive problem solvers, experienced engineering architects, and result leaders who will have a great impact at the exciting three-way intersection of computer science, engineering, and ethics.

Our program offers a multitude of courses in Big Data engineering and analytics in addition to supplementary courses that are required to deliver the data analytics results in a meaningful way to management. We cover data management, advanced data management, business intelligence, column databases, data science, and Big Data engineering. We offer advanced functional programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multithread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large-scale analytics to make things run faster by a hundredfold increase in speed. Due to the high-level mathematical operations required to run these programs, only software engineers have the capacity to work in such complicated areas. Only they can make the necessary mathematical algorithms execute quickly enough to get the finest results.

Our engineers become fluent in data science for the sake of building the actual system. They study how to write machine-learning algorithms on top of statistical packages.

- Students study the fundamentals of logical computing formulation and program construction as well as the mathematical modeling and analysis of algorithms—an essential aspect of data science analytics.
- Students study clustering techniques, along with topic modeling and classification and logical regression techniques, as well as Bayesian statistics.
- Students study how to configure and operate a Hadoop environment (large clusters of commodity hardware) and in the process how to integrate data from diverse sources to move and manage data through Big Data platforms (in-house or in the cloud). Data ingestion, the filtering and firing of millions of operations to run over large clusters of commodity hardware, is a software engineering technique that we teach our students how to perform through Scala, multithreading, Spark programming, and “map-reduce” techniques.
- We show students how to make the business case for analytics projects and how to follow an execution road map that involves understanding the architectures underpinning such gigantic platforms as well as the resourcing and cost issues.

Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three options: coursework, project, or thesis.

Master's project and thesis options must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a master's project or a thesis need to be submitted at least one month before the start of the semester.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CSYE 6200	Concepts of Object-Oriented Design	4
INFO 6205	Program Structure and Algorithms	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the restricted electives course list below. (p. 731)		12
Complete 12 semester hours from the other electives course list below. (p. 731)		12

PROJECT OPTION

Code	Title	Hours
CSYE 7945	Master's Project	4
Complete 8 semester hours from the restricted electives course list below. (p. 731)		8
Complete 12 semester hours from the other electives course list below. (p. 731)		12

THESIS OPTION

Code	Title	Hours
CSYE 7945	Master's Project	4
CSYE 7990	Thesis	4
Complete 4 semester hours from the restricted electives course list below. (p. 731)		4
Complete 12 semester hours from the other electives course list below. (p. 731)		12

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Restricted Electives

Code	Title	Hours
Complete courses from the following subject code:		
CSYE		

Other Electives

Code	Title	Hours
Complete courses from any of the following subject codes:		
CSYE		
DAMG		
INFO (INFO 6250 excluded)		
TELE		

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6000 to qualify for co-op experience):		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Software Engineering Systems, MS (Boston)

Website (<http://www.coe.neu.edu/degrees/ms-cse/>)

The software engineering systems program takes a sociotechnical, engineering approach to software. This engineering foundation is designed to enable students to embrace real-world complexity as a golden opportunity, especially for the more technically advanced student. We are committed to shaping our students to be intuitive problem solvers, experienced engineering architects, and result leaders who will have a great impact at the exciting three-way intersection of computer science, engineering, and ethics.

Our program offers a multitude of courses in Big Data engineering and analytics in addition to supplementary courses that are required to deliver the data analytics results in a meaningful way to management. We cover data management, advanced data management, business intelligence, column databases, data science, and Big Data engineering. We offer advanced functional programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multithread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large-scale analytics to make things run faster by a hundredfold increase in speed. Due to the high-level mathematical operations required to run these programs, only software engineers have the capacity to work in such complicated areas. Only they can make the necessary mathematical algorithms execute quickly enough to get the finest results.

Our engineers become fluent in data science for the sake of building the actual system. They study how to write machine-learning algorithms on top of statistical packages.

- Students study the fundamentals of logical computing formulation and program construction as well as the mathematical modeling and analysis of algorithms—an essential aspect of data science analytics.
- Students study clustering techniques, along with topic modeling and classification and logical regression techniques, as well as Bayesian statistics.
- Students study how to configure and operate a Hadoop environment (large clusters of commodity hardware) and in the process how to integrate data from diverse sources to move and manage data through Big Data platforms (in-house or in the cloud). Data ingestion, the filtering and firing of millions of operations to run over large clusters of commodity hardware, is a software engineering technique that we teach our students how to perform through Scala, multithreading, Spark programming, and “map-reduce” techniques.
- We show students how to make the business case for analytics projects and how to follow an execution road map that involves understanding the architectures underpinning such gigantic platforms as well as the resourcing and cost issues.

Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three options: coursework, project, or thesis.

Master's project and thesis options must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a master's project or a thesis need to be submitted at least one month before the start of the semester.

Graduate Certificate Options

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Software Engineering Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Software Engineering Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved software design engineering technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 16 semester hours of the certificate coursework may be applied to this program's elective requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CSYE 6200	Concepts of Object-Oriented Design	4
INFO 6205	Program Structure and Algorithms	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
	Complete 12 semester hours from the restricted electives course list below. (p. 733)	12
	Complete 12 semester hours from the other electives course list below. (p. 733)	12

PROJECT OPTION

Code	Title	Hours
CSYE 7945	Master's Project	4
	Complete 8 semester hours from the restricted electives course list below. (p. 733)	8
	Complete 12 semester hours from the other electives course list below. (p. 733)	12

THESIS OPTION

Code	Title	Hours
CSYE 7945	Master's Project	4
CSYE 7990	Thesis	4
	Complete 4 semester hours from the restricted electives course list below. (p. 733)	4
	Complete 12 semester hours from the other electives course list below. (p. 733)	12

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
	Complete the following (students must complete ENCP 6000 to qualify for co-op experience):	
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)
Minimum 3.000 GPA required

Restricted Electives

Code	Title	Hours
	Complete courses from the following subject code:	
CSYE		

Other Electives

Code	Title	Hours
	Complete courses from any of the following subject codes:	
CSYE		
DAMG		
INFO (INFO 6250 excluded)		
TELE		

Software Engineering Systems, MS (Toronto)

Admissions to this program will open for the 2026-2027 academic year.

Website (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-swes/>)

The software engineering systems program takes a sociotechnical, engineering approach to software. This engineering foundation is designed to enable students to embrace real-world complexity as a golden opportunity, especially for the more technically advanced student. We are committed

to shaping our students to be intuitive problem solvers, experienced engineering architects, and result leaders who will have a great impact at the exciting three-way intersection of computer science, engineering, and ethics.

Our program offers a multitude of courses in Big Data engineering and analytics in addition to supplementary courses that are required to deliver the data analytics results in a meaningful way to management. We cover data management, advanced data management, business intelligence, column databases, data science, and Big Data engineering. We offer advanced functional programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multithread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large-scale analytics to make things run faster by a hundredfold increase in speed. Due to the high-level mathematical operations required to run these programs, only software engineers have the capacity to work in such complicated areas. Only they can make the necessary mathematical algorithms execute quickly enough to get the finest results.

Our engineers become fluent in data science for the sake of building the actual system. They study how to write machine-learning algorithms on top of statistical packages.

- Students study the fundamentals of logical computing formulation and program construction as well as the mathematical modeling and analysis of algorithms—an essential aspect of data science analytics.
- Students study clustering techniques, along with topic modeling and classification and logical regression techniques, as well as Bayesian statistics.
- Students study how to configure and operate a Hadoop environment (large clusters of commodity hardware) and in the process how to integrate data from diverse sources to move and manage data through Big Data platforms (in-house or in the cloud). Data ingestion, the filtering and firing of millions of operations to run over large clusters of commodity hardware, is a software engineering technique that we teach our students how to perform through Scala, multithreading, Spark programming, and “map-reduce” techniques.
- We show students how to make the business case for analytics projects and how to follow an execution road map that involves understanding the architectures underpinning such gigantic platforms as well as the resourcing and cost issues.

Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000. Students must complete the master's degree by pursuing a thesis.

The thesis must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a thesis need to be submitted at least one month before the start of the semester.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CSYE 6200	Concepts of Object-Oriented Design	4
CSYE 7230	Software Engineering	4
INFO 6205	Program Structure and Algorithms	4

Thesis

Code	Title	Hours
CSYE 7945	Master's Project	4
CSYE 7990	Thesis	4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Electives

Code	Title	Hours
Complete 8 semester hours from the course code CYSE toward the elective requirement.		8
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 6220	Enterprise Software Design	
CSYE 6225	Network Structures and Cloud Computing	
CSYE 6230	Operating Systems	
CSYE 6305	Introduction to Quantum Computing with Applications	
CSYE 7105	High-Performance Parallel Machine Learning and AI	
CSYE 7125	Advanced Cloud Computing	
CSYE 7200	Big-Data System Engineering Using Scala	

CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming
CSYE 7220	Deployment and Operation of Software Applications
CSYE 7270	Building Virtual Environments
CSYE 7280	User Experience Design and Testing
CSYE 7370	Deep Learning and Reinforcement Learning in Game Engineering
CSYE 7374	Special Topics in Computer Systems Engineering
CSYE 7470	Advanced Game Analytics
CSYE 7550	Distributed Intelligent Agents in the Metaverse
CSYE 7976	Directed Study

A maximum of 4 semester hours may be taken from the following list toward the elective requirement

4

DAMG 6105	Data Science Engineering with Python
DAMG 6210	Data Management and Database Design
DAMG 7245	Big-Data Systems and Intelligence Analytics
DAMG 7250	Big Data Architecture and Governance
DAMG 7275	Advanced Database Management Systems
DAMG 7350	Systems and Cybersecurity Fundamentals
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence
DAMG 7374	Special Topics in Data Architecture and Management
DAMG 7976	Directed Study
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100
INFO 6105	Data Science Engineering Methods and Tools
INFO 6150	Web Design and User Experience Engineering
INFO 7225	Accounting and Budgetary Systems for Engineers
INFO 7245	Agile Software Development
INFO 7255	Advanced Big-Data Applications and Indexing Techniques
INFO 7260	Business Process Engineering
INFO 7385	Managerial Communications for Engineers
INFO 7390	Advances in Data Sciences and Architecture
INFO 7500	Cryptocurrency and Smart Contract Engineering

OPTIONAL CO-OP EXPERIENCE

Code	Title	Hours
Complete the following (students must complete ENCP 6000 to qualify for co-op experience):		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Telecommunication Networks, MS (Boston)

For program contact information, please visit this website (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-tnet/>).

The Master of Science in Telecommunication Networks is designed for professionals currently in the telecommunications or networking field who either wish to enhance their technical skills and credentials or who wish to make a transition to the business side of telecommunications or networking. We also welcome applications from prospective students with limited industry experience. This program, which may be pursued on a full- or part-time basis, is one of only a very few master's programs in telecommunications and networking in the United States that is truly multidisciplinary, giving students the flexibility to tailor the curriculum to their specific interests, backgrounds, and career goals.

Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three options: coursework, project, or thesis. Although there are some dependencies among the core courses, the program may be started in either the fall or spring semester. The three core courses each carry 4 semester hours of credit.

Master's project and thesis options must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a master's project or a thesis need to be submitted at least one month before the start of the semester.

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Telecommunication Networks with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Telecommunication Networks in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate require 12 semester hours of technical core courses from the telecommunication networks program and 4 semester hours from the technical course list provided for this program. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 16 semester hours of the certificate coursework may be applied to this program's elective requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4
TELE 5350	Telecom and Network Infrastructure	4
TELE 5360	Internet Protocols and Architecture	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 20 semester hours from the electives course list below. (p. 736)		20

PROJECT OPTION

Code	Title	Hours
TELE 7945	Master's Project	4
Complete 16 semester hours from the electives course list below. (p. 736)		16

THESIS OPTION

Code	Title	Hours
TELE 7945	Master's Project	4
TELE 7990	Thesis	4
Complete 12 semester hours from the electives course list below. (p. 736)		12

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Electives

Code	Title	Hours
Complete courses from any of the following subject codes:		
CSYE		
DAMG		
INFO		
TELE		

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6000 to qualify for co-op experience):		
ENCP 6000	Career Management for Engineers	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

Minimum of 32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Blockchain and Smart Contract Engineering, Graduate Certificate (Arlington)

The Graduate Certificate in Blockchain and Smart Contract Engineering addresses the rapidly growing and revolutionary field of distributed ledger (blockchain) technology. Companies from different industries are preparing to enhance their business practices through cryptocurrency, decentralized computing, digital security, smart contracts, and more. The certificate program covers blockchain platforms such as Ethereum that bring about transparency and trust to all participants in complex multiparty relationships. The implication is tremendous—from new currency and incentive systems to faster, less expensive, and more efficient transactions of all kinds, from banking to healthcare. Students have an opportunity to learn how blockchain platforms and their underlying trust models will impact the future of legally binding multiparty contracts. In addition, students also have an opportunity to learn how crypto-engineering techniques can be used to create digital trust fabrics that could safely facilitate the movement of any kind of transactions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
INFO 7500	Cryptocurrency and Smart Contract Engineering	4
INFO 7510	Smart Contract Application Engineering and Development	4
INFO 7520	Engineering of Advanced Cryptocurrency Systems	4
INFO 7525	Regulatory Aspects of Smart Contract Automation	2
INFO 7535	Digital Smart Contracts Product Innovations	2

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Blockchain and Smart Contract Engineering, Graduate Certificate (Boston)

The Graduate Certificate in Blockchain and Smart Contract Engineering addresses the rapidly growing and revolutionary field of distributed ledger (blockchain) technology. Companies from different industries are preparing to enhance their business practices through cryptocurrency, decentralized computing, digital security, smart contracts, and more. The certificate program covers blockchain platforms such as Ethereum that bring about transparency and trust to all participants in complex multiparty relationships. The implication is tremendous—from new currency and incentive systems to faster, less expensive, and more efficient transactions of all kinds, from banking to healthcare. Students have an opportunity to learn how blockchain platforms and their underlying trust models will impact the future of legally binding multiparty contracts. In addition, students also have an opportunity to learn how crypto-engineering techniques can be used to create digital trust fabrics that could safely facilitate the movement of any kind of transactions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
INFO 7500	Cryptocurrency and Smart Contract Engineering	4
INFO 7510	Smart Contract Application Engineering and Development	4

INFO 7520	Engineering of Advanced Cryptocurrency Systems	4
INFO 7525	Regulatory Aspects of Smart Contract Automation	2
INFO 7535	Digital Smart Contracts Product Innovations	2

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Broadband Wireless Systems, Graduate Certificate (Boston)

The broadband wireless systems graduate certificate program focuses on the fundamentals of wireless communications, IP networks and protocols, and telecommunications infrastructure as preparation for developing expertise in ongoing developments in mobile networking, broadband wireless communications, and mobile apps.

The four-course graduate certificate requires that two TNET core technical courses be taken along with two other specified courses. With the approval of the certificate director, one of the core courses may be waived with another technical course taken in its place. Mobile Wireless Communications and Networking (TELE 6100) may not be waived under any circumstances.

Note: Master of Science in Telecommunication Networks students are eligible for this graduate certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4
TELE 5350	Telecom and Network Infrastructure	4
TELE 5360	Internet Protocols and Architecture	4
TELE 6100	Mobile Wireless Communications and Networking	4

Program Credit/GPA Requirements

16 total semester hours required
Minimum 3.000 GPA required

Engineering Leadership, Graduate Certificate (Boston)

The Gordon Engineering Leadership Program is a transformational, technical, and challenging graduate-level learning experience targeted for engineering professionals.

The Gordon Engineering Leadership Program directed by the Gordon Institute of Engineering Leadership offers a graduate certificate that pairs with over 25 master's degrees in the College of Engineering, College of Science, and Khoury College of Computer Sciences. The Gordon Program is a transformational graduate program designed to build a future corps of engineering leadership professionals.

Pursuing the graduate certificate allows participants to:

- Take part in a hands-on curriculum taught by industry-experienced professors
- Work with peers from across engineering fields on leadership skills development
- Receive one-on-one mentoring from industry experts and faculty

The Gordon Engineering Leadership Program anchors around an intense, market-worthy challenge project based on your organization's strategic needs. This is a unique opportunity to apply your classroom experience in a professional setting, potentially further accelerating your career.

How to Earn a Graduate Certificate in Engineering Leadership

If you already have a Master of Science, then you can complete the one-year program to earn a Graduate Certificate in Engineering Leadership.

If you do not have a Master of Science, then you can still be considered for the Graduate Certificate in Engineering Leadership if you have at least three years of engineering work experience.

Additional information can be found on the Gordon Engineering Leadership Program website. (<https://gordon.northeastern.edu>)

Beyond a Graduate Certificate

Most candidates pursue the Gordon Engineering Leadership Program as part of a Master of Science degree in the engineering discipline of their choice. Upon completion, they earn both a Master of Science degree and a Graduate Certificate in Engineering Leadership.

Students can enroll in the Engineering Leadership Graduate Certificate while pursuing the following degrees:

- MS Advanced and Intelligent Manufacturing (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/advanced-and-intelligent-manufacturing/>)
- MS Biotechnology (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-science/ms-in-biotechnology/>)
- MS Climate Science and Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/climate-science/>)
- MS Computer Science (<https://gordon.northeastern.edu/certificate-and-degree-options/khoury-college-of-computer-sciences/computer-science/>)
- MS Cybersecurity (<https://gordon.northeastern.edu/certificate-and-degree-options/khoury-college-of-computer-sciences/ms-in-information-assurance-and-cyber-security/>)
- MS Data Analytics Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-data-analytics-engineering/>)
- MS Engineering and Public Policy (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-engineering-and-public-policy/>)
- MS Human Factors (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/human-factors/>)
- MS Robotics (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/robotics/>)
- MS Telecommunication Networks (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-telecommunication-networks/>)
- MSBioE Bioengineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-bioengineering/>)
- MSCHE Chemical Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/chemical-engineering/>)
- MSCivE Civil Engineering (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-civil-engineering/>)
- MSCSE Software Engineering Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-computer-systems-engineering/>)
- MSECE Electrical and Computer Engineering (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-electrical-and-computer-engineering/>)
- MSECLE Electrical and Computer Engineering Leadership (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-electrical-and-computer-engineering-leadership/>)
- MSEM Engineering Management (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-engineering-management/>)
- MENE Energy Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-energy-systems/>)
- MEnvE Environmental Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-environmental-engineering/>)
- MSIE Industrial Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-industrial-engineering/>)
- MSIS Information Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-information-systems/>)
- MSME Mechanical Engineering (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-mechanical-engineering/>)
- MSOR Operations Research (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-operations-research/>)
- MSSBS Sustainable Building Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-sustainable-building-systems/>)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ENLR 5121	Engineering Leadership 1	2
ENLR 5122	Engineering Leadership 2	2
ENLR 5131	Scientific Foundations of Engineering 1	2
ENLR 5132	Scientific Foundations of Engineering 2	2
Complete the following two courses based on the discipline of your master's program:		
ENLR 7440	Engineering Leadership Challenge Project 1	4
or EECE 7440	Electrical and Computer Engineering Leadership Challenge Project 1	

or ENSY 7440	Energy Systems Engineering Leadership Challenge Project 1	4
or IE 7440	Industrial Engineering Leadership Challenge Project 1	
or ME 7440	Mechanical Engineering Leadership Challenge Project 1	
or TELR 7440	Technology Leadership Challenge Project 1	
ENLR 7442	Engineering Leadership Challenge Project 2	4
or EECE 7442	Electrical and Computer Engineering Leadership Challenge Project 2	
or ENSY 7442	Energy Systems Engineering Leadership Challenge Project 2	
or IE 7442	Industrial Engineering Leadership Challenge Project 2	
or ME 7442	Mechanical Engineering Leadership Challenge Project 2	
or TELR 7442	Technology Leadership Challenge Project 2	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

IP Telephony Systems, Graduate Certificate (Boston)

The Graduate Certificate in IP Telephony Systems focuses on the fundamental knowledge in communications, IP networks and protocols, media transport, and signaling as preparation to developing expertise into ongoing developments in VoIP networks and services, the IP Multimedia Subsystem (IMS), unified communications, and video networks.

The four-course graduate certificate requires that three TNET core technical courses be taken along with a specified fourth course. With the approval of the certificate director, one of the core courses may be waived with another technical course taken in its place. Unified Communications and Collaboration (TELE 6350) may not be waived under any circumstance.

Note: Master of Science in Telecommunication Systems Management/Telecommunication Networks students are not eligible for this graduate certificate.

Program Requirements

Core Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4
TELE 5350	Telecom and Network Infrastructure	4
TELE 5360	Internet Protocols and Architecture	4
TELE 6350	Unified Communications and Collaboration	4

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Medical Software Engineering, Graduate Certificate (Boston)

The Graduate Certificate in Medical Software Engineering at Northeastern University is a pioneering initiative that addresses the evolving landscape of healthcare in the digital age. With a focus on interconnected ecosystems, the program aims to equip healthcare IT engineers with the knowledge and skills needed to navigate the complex web of healthcare services, ensuring patient safety and fostering collaboration among diverse stakeholders. Medical software engineering integrates principles of ecosystem design, systems engineering, zero-trust foundations, collaboration tools, and interoperability/data governance to create a holistic approach to healthcare IT. Students in this program have an opportunity to design and implement effective, ethical, and interconnected healthcare information systems, bridging the gap between technology and healthcare delivery.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
Required Courses		
CSYE 7280	User Experience Design and Testing	4
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

INFO 7405	Advances in Engineering Medical Information Systems	4
INFO 7410	Advanced Medical Device Software Engineering	4

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Software Engineering Systems, Graduate Certificate (Arlington)

The Graduate Certificate in Software Engineering Systems focuses on the sociotechnical approach to software engineering with attention on using engineering tools and considering real-world complexities to design and construct practical and viable software solutions.

This four-course graduate certificate is designed to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to software development with attention on enterprise design and integration, secure systems design and creation, and data integration and architecture.

Note: Master of Science in Software Engineering Systems students are not eligible for this graduate certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
CSYE 6200	Concepts of Object-Oriented Design	4
INFO 6205	Program Structure and Algorithms	4

Electives

Code	Title	Hours
Complete two of the following:		8
CSYE 6225	Network Structures and Cloud Computing	
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	
CSYE 7280	User Experience Design and Testing	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Software Engineering Systems, Graduate Certificate (Boston)

The Graduate Certificate in Software Engineering Systems focuses on the sociotechnical approach to software engineering with attention on using engineering tools and considering real-world complexities to design and construct practical and viable software solutions.

This four-course graduate certificate is designed to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to software development with attention on enterprise design and integration, secure systems design and creation, and data integration and architecture.

Note: Master of Science in Software Engineering Systems students are not eligible for this graduate certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
CSYE 6200	Concepts of Object-Oriented Design	4
INFO 6205	Program Structure and Algorithms	4

Electives

Code	Title	Hours
Complete two of the following:		8
CSYE 6225	Network Structures and Cloud Computing	
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	
CSYE 7280	User Experience Design and Testing	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Interdisciplinary Graduate Programs

Doctor of Philosophy (PhD)

- Cybersecurity (Boston) (p. 418)
- Interdisciplinary Engineering (Boston) (p. 486)

Master of Science (MS)

- Applied Physics and Engineering (Boston) (p. 557)
- Artificial Intelligence (Boston) (p. 164)
- Climate Science and Engineering (Boston) (p. 520)
- Data Science (Boston) (p. 169)
- Data Science—Align (Boston) (p. 172)
- Extended Realities (Boston) (p. 175)
- Product Development (Boston) (p. 765)

Graduate Certificates

- AI Applications (Boston) (p. 190)
- AI Applications (Silicon Valley) (p. 191)
- Product Management (Boston) (p. 192)

Cybersecurity, PhD (Boston)

A research-based, interdisciplinary Doctor of Philosophy (PhD) in Cybersecurity combines a strong security technical foundation with a security policy and social sciences perspective. It seeks to prepare graduates to advance the state of the art of security in systems, networks, and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Students who choose the PhD in Cybersecurity program have a strong desire to pursue academic research solving critical cybersecurity challenges facing today's society. The PhD program is a natural path for students in the college's Master of Science in Cybersecurity (<http://www.ccs.neu.edu/graduate/degree-programs/m-s-in-information-assurance/>) program who want to pursue research and students with bachelor's degrees and an interest in research-focused careers. Students who pursue careers in advancing the state of the art of cybersecurity have an opportunity to gain:

- A strong technical foundation in cybersecurity and an interdisciplinary perspective based on policy and social science
- A path to a research-focused career coupled with depth in information assurance research at a leading institution, one of the earliest designees by NSA/DHS as a National Center of Academic Excellence in Information Assurance Research, Information Assurance/Cyber Defense, and Cyber Operations
- The opportunity to work with and learn from faculty who are recognized internationally for their expertise and contributions in information assurance from Northeastern University's Khoury College of Computer Sciences, the Department of Electrical and Computer Engineering, and the College of Social Sciences and Humanities
- Access to research projects at Northeastern's research centers focused on security:
 - The Cybersecurity and Privacy Institute (<https://cyber.ccis.northeastern.edu/about/>): The mission of Northeastern's Cybersecurity and Privacy Institute is to safeguard critical technology. Forging partnerships with experts in industry, government, and academia worldwide, the Institute's faculty and students develop, protect, and enhance technologies on which the world relies—from mobile devices and “smart” IoT applications to tomorrow's self-driving cars and delivery drones. Their expertise spans algorithm auditing; cloud security; cryptography; differential privacy; embedded device security; internet-scale security measurements; machine learning; big data; security, malware, and advanced threats; network protocols and security; web and mobile security; and wireless network security.

- The International Secure Systems Lab (<http://www.iseclab.org/>), affiliated with Northeastern, a collaborative effort of European and U.S. researchers focused on web security, malware, and vulnerability analysis; intrusion detection; and other computer security issues.
- The ALERT Center (<http://www.northeastern.edu/alert/>), where Northeastern is the lead institution, a multiuniversity Department of Homeland Security Center of Excellence involved in research, education, and technology related to threats from explosives.

The benefits of the Boston area:

- World-renowned for academic and research excellence, the Boston area is also home to some of the nation's largest Department of Defense contractors and government and independent labs such as MIT Lincoln Lab, MITRE, and Draper Lab.

Degree Requirements

The PhD in Cybersecurity degree requires completion of at least 48 semester hours beyond a bachelor's degree. Students who enter with an undergraduate degree will typically need four to five years to complete the program, and they will be awarded a master's degree en route to the PhD.

Doctoral Degree Candidacy

A student is considered a PhD degree candidate after completing the core courses with at least a 3.500 GPA, with no grades lower than a B in the core courses, and either publishing a paper in a strong conference or journal or passing an oral exam that is conducted by a committee of three cybersecurity faculty members and based on paper(s) written by the student.

RESIDENCY

One year of continuous full-time study is required after admission to the PhD candidacy. During this period, the student will be expected to make substantial progress in preparing for the comprehensive examination.

TEACHING REQUIREMENT

All cybersecurity PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment or quiz or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

DISSERTATION ADVISING

The doctoral dissertation advising team for each student consists of two cybersecurity faculty members, one in a technical area. When appropriate, the second faculty advisor will be from the policy/social science area.

DISSERTATION COMMITTEE

With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD cybersecurity curriculum committee. The four members must include the advisor, two internal members, and an external member.

COMPREHENSIVE EXAMINATION

A PhD student must submit a written dissertation proposal and present it to the dissertation committee. The proposal should identify the research problem, the research plan, and the potential impact of the research on the field. The presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee after the public presentation.

DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in cybersecurity.

AWARDING OF MASTER'S DEGREES

Students who enter the PhD in Cybersecurity program with a bachelor's degree have the option of earning a master's degree from one of the departments participating in the program. To do so, they must meet all of the department's degree requirements.

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Teaching
Qualifying exam and area exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirements

A grade of B or higher is required in each core course. A cumulative 3.500 grade-point average is required for the core requirement.

Code	Title	Hours
Foundations		
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4
CY 5770	Software Vulnerabilities and Security	4
or EECE 5641	Introduction to Software Security	
CY 6740	Network Security	4
or EECE 5699	Computer Hardware and System Security	

Electives and Tracks

Code	Title	Hours

Note: Consult faculty advisor for other acceptable courses.

Tracks	
Select at least two courses from one track:	8

<i>Hardware Security</i>		
CS 6410	Compilers	
EECE 5666	Digital Signal Processing	
EECE 7352	Computer Architecture	
EECE 7364	Mobile and Wireless Networking	
EECE 7390	Computer Hardware Security	
<i>Machine Learning</i>		
CS 5700	Fundamentals of Computer Networking	
CS 6140	Machine Learning	
CS 7150	Deep Learning	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	
<i>Network Security</i>		
CY 6740	Network Security	
CS 7610	Foundations of Distributed Systems	
CS 7775	Seminar in Computer Security	
CY 5130	Computer System Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7336	Digital Communications	
EECE 7364	Mobile and Wireless Networking	
EECE 7374	Fundamentals of Computer Networks	
<i>Systems Security</i>		
CS 6410	Compilers	
CS 7600	Intensive Computer Systems	
CS 7610	Foundations of Distributed Systems	
CY 5130	Computer System Security	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
EECE 7352	Computer Architecture	
<i>Theory</i>		
CS 7800	Advanced Algorithms	
CS 7805	Complexity Theory	
CS 7810	Foundations of Cryptography	
CS 7870	Seminar in Theoretical Computer Science	
EECE 7337	Information Theory	
<i>Usable Security and Privacy</i>		
CS 6350	Empirical Research Methods	

CS 6760	Privacy, Security, and Usability
CS 7340	Theory and Methods in Human Computer Interaction
INSH 6300	Research Methods in the Social Sciences
INSH 6302	Qualitative Methods
INSH 6500	Statistical Analysis
INSH 7400	Quantitative Analysis
<i>Cybersecurity Policy</i>	
CRIM 6200	Criminology
CRIM 6262	Evidence-Based Crime Policy
CY 5200	Security Risk Management and Assessment
CY 5210	Information System Forensics
CY 5250	Decision Making for Critical Infrastructure
POLS 7341	Security and Resilience Policy

Electives

Selected in consultation with advisor from graduate-level CS and ECE courses and graduate-level courses offered by the College of Social Sciences and Humanities, including CRIM, CS, CY, DS, EECE, INSH, MATH and POLS.

28

Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements**Degree Requirements**

Incoming PhD in Cybersecurity students who have already completed a Master of Science in an adjacent field may petition to the graduate program administration for advanced entry. Advanced entry petitions are reviewed by the program administration on a case-by-case basis. Please note that advanced entry does not waive by itself any part of the PhD coursework requirements. As a degree conferral requirement, a minimum of 16 semester hours of coursework beyond the 32 semester hours of the master's degree is required of advanced entry PhD students (48 semester hours is required of standard entry PhD students). A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

Doctoral Degree Candidacy

Refer to the PhD Cybersecurity overview (p. 418) for admission to candidacy requirements.

Residency

Refer to the PhD Cybersecurity overview (p. 418) for residency requirements.

Teaching Requirement

Refer to the PhD Cybersecurity overview (p. 418) for teaching requirements.

Dissertation Advising

Refer to the PhD Cybersecurity overview (p. 418) for dissertation advising requirements.

Dissertation Committee

Refer to the PhD Cybersecurity overview (p. 418) for dissertation committee requirements.

Comprehensive Examination

Refer to the PhD Cybersecurity overview (p. 418) for comprehensive examination requirements.

Dissertation Defense

Refer to the PhD Cybersecurity overview (p. 418) for dissertation defense and completion requirements.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Teaching
Qualifying exam and area exam
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirement

Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each core course.

Code	Title	Hours
Consult your faculty advisor for approved courses.		16

Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

Program Credit/GPA Requirements

Minimum 16 semester hours required
Minimum 3.000 GPA required

Interdisciplinary Engineering, PhD (Boston)

130 Snell Engineering Center
617.373.2711

The College of Engineering offers an interdisciplinary engineering Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. This is an individually designed program for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with their faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern University's established degree standards but need not agree exactly with the regulations of individual units. Individually designed interdisciplinary degree programs must be approved by the appropriate graduate office(s).

The interdisciplinary engineering program admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements as well as all the required coursework.

Program Requirements

In order to pursue an individually designed interdisciplinary engineering graduate program, a student must have been accepted into the interdisciplinary engineering program by an approved graduate program that will serve as the administrative home unit for the interdisciplinary engineering program:

- Department of Bioengineering (p. 470)
- Department of Chemical Engineering (p. 499)
- Department of Civil and Environmental Engineering (p. 514)
- Department of Electrical and Computer Engineering (p. 544)
- Department of Mechanical and Industrial Engineering (p. 612)

Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary engineering PhD program with the department from which they were dismissed as either home or participating department.

The interdisciplinary engineering PhD program requires a commitment from a Northeastern faculty member to serve as the student's primary faculty advisor and chair of their interdisciplinary engineering PhD committee. The primary faculty member is affiliated with the program's administrative home unit unless otherwise approved by the administrative home unit. The PhD advisory committee must be assembled within the first semester of the program, and at least two units must be represented on the committee. The committee must include at least one faculty co-advisor from all participating academic units and otherwise conforms to the rules of the home unit. This committee will be responsible for overseeing the completion

of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

Supplementary Interdisciplinary Engineering PhD Program Forms

Successful application and admission to the interdisciplinary engineering PhD program requires a completed Program Preliminary Study Plan, available on the COE Graduate Student Services Forms website. This form provides a memorandum of understanding for your proposed PhD including the primary departments and advisor(s), a brief description of the planned research, and explanation of the rationale for an interdisciplinary PhD program.

No later than one year postentry into the program, a completed and signed Interdisciplinary Program Plan must be submitted to the Graduate School of Engineering. This individually designed plan includes a list of courses to be taken, a description of the qualifying and comprehensive examination process to be used, a timeline, and any other requirements of the program. This form can be found on the COE Graduate Student Services Forms website.

Qualifying Examination and Degree Candidacy

Interdisciplinary engineering PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the other department(s) involved with the student's program of study. To qualify as an interdisciplinary engineering doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required coursework.

Dissertation

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary engineering PhD students must follow the dissertation guidelines of their home department.

Residency Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. Successful completion of the total interdisciplinary engineering PhD program depends on meeting department academic milestones and academic expectations.

Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

Program Requirements

Direct Entry

Complete all requirements listed below unless otherwise indicated.

Milestones

Interdisciplinary Engineering PhD Program Preliminary Study Plan	Interdisciplinary Program Plan	Dissertation committee formation

Doctoral qualifying exams (both written comprehensive and oral area exams)

Annual review

Dissertation proposal

Dissertation defense

Requirements

Code	Title	Hours
A minimum of 48 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		48

Dissertation Course Requirements

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters according to their academic home unit:

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	

BIOE 9991	Dissertation Term 2
or CHME 9991	Dissertation Term 2
or CIVE 9991	Dissertation Term 2
or EECE 9991	Dissertation Term 2
or IE 9991	Dissertation Term 2
or ME 9991	Dissertation Term 2

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.000 GPA required

Advanced Entry Program Requirements

Advanced Entry

Complete all requirements listed below unless otherwise indicated.

Milestones

Interdisciplinary Engineering PhD Program Preliminary Study Plan Interdisciplinary Program Plan Dissertation committee formation Doctoral qualifying exams (both written comprehensive and oral area exams) Annual review Dissertation proposal Dissertation defense

Requirements

Code	Title	Hours
A minimum of 20 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		20

Dissertation Course Requirements

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters according to their academic home unit:

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

Program Credit/GPA Requirements

20 total semester hours required
Minimum 3.000 GPA required

Applied Physics and Engineering, MS (Boston)

The combined MS program in applied physics and engineering allows graduate students to receive training in one of three concentrations of the electrical and computer engineering department while also receiving fundamental graduate-level physics training that is relevant to that area.

Thesis Option

Students may register for an additional two semesters of thesis work. Depending on the affiliation of the thesis advisor, students may register for Thesis (PHYS 7990) for a total of 8 semester hours or 4 semester hours of Master's Project (EECE 7945) followed by 4 semester hours of Thesis (EECE 7990). Thesis credits cannot be substituted for any of the coursework listed above. This option requires a total of 40 semester hours for the master's degree. A thesis committee is composed of an advisor and two faculty members from physics or electrical engineering.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Concentrations

Complete one of the following concentrations:

- Analysis, Modeling, and Computation (p. 558)
- Electromagnetics, Plasma, and Optics (p. 558)
- Microsystems, Materials, and Devices (p. 559)

Optional Thesis

Code	Title	Hours
Select one of the following options based on the college affiliation of the thesis advisor. Thesis coursework will not be applied to other requirements of this degree program. Completion of this thesis option requires a total of 40 semester hours to earn the degree:		8

Option 1 (College of Science thesis advisor)

PHYS 7990	Thesis (completed twice over two semesters)

Option 2 (College of Engineering thesis advisor)

EECE 7945	Master's Project
EECE 7990	Thesis

Program Credit/GPA Requirements

32 total semester hours required (40 with optional thesis)

Minimum 3.000 GPA required

ANALYSIS, MODELING, AND COMPUTATION

Code	Title	Hours
Core Courses		
EECE 7205	Fundamentals of Computer Engineering	4
PHYS 7321	Computational Physics	4
Engineering Coursework		
Complete 12 semester hours from the following:		12
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7374	Fundamentals of Computer Networks	
Physics Coursework		
Complete 12 semester hours from the following:		12
PHYS 5116	Network Science 1	
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7305	Statistical Physics	
PHYS 7335	Dynamical Processes in Complex Networks	

ELECTROMAGNETICS, PLASMA, AND OPTICS

Code	Title	Hours
Core Courses		
EECE 7203	Complex Variable Theory and Differential Equations	4
PHYS 7302	Electromagnetic Theory	4
Engineering Coursework		
Complete 12 semester hours from the following:		12
EECE 5698	Special Topics in Electrical and Computer Engineering (Subsurface Imaging)	

EECE 7105	Optics for Engineers
EECE 7202	Electromagnetic Theory 1
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7293	Modern Imaging

Physics Coursework

Complete 12 semester hours from the following: 12

PHYS 5318	Principles of Experimental Physics
PHYS 7305	Statistical Physics
PHYS 7315	Quantum Theory 1
PHYS 7316	Quantum Theory 2
PHYS 7321	Computational Physics
PHYS 7324	Condensed Matter Physics
PHYS 7731	Physics of Biological Processes and Living Systems 1

MICROSYSTEMS, MATERIALS, AND DEVICES

Code	Title	Hours
Core Courses		
EECE 7201	Solid State Devices	4
PHYS 7324	Condensed Matter Physics	4

Engineering Coursework

Complete 12 semester hours from the following: 12

EECE 5606	Micro- and Nanofabrication
EECE 5680	Electric Drives
EECE 7204	Applied Probability and Stochastic Processes
EECE 7240	Analog Integrated Circuit Design
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7353	VLSI Design
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering

Physics Coursework

Complete 12 semester hours from the following: 12

PHYS 5318	Principles of Experimental Physics
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7302	Electromagnetic Theory
PHYS 7305	Statistical Physics
PHYS 7315	Quantum Theory 1
PHYS 7316	Quantum Theory 2
PHYS 7321	Computational Physics
PHYS 7734	Topics: Condensed Matter Physics

Artificial Intelligence, MS (Boston)

The Master of Science in Artificial Intelligence provides a comprehensive framework encompassing foundational algorithms, theory, and practical applications in the rapidly evolving field of AI. This program offers students the essential knowledge and skills to design, develop, and implement AI systems across various high-demand sectors. The core curriculum is designed to provide in-depth understanding of fundamental AI concepts, forming a solid foundation for both theoretical and practical aspects of artificial intelligence.

Building on this strong foundation, students can delve into advanced AI applications through interdisciplinary concentrations tailored to industry needs. These concentrations include computer vision, continuous process engineering, machine learning, and robotics and agent-based systems.

The master's in artificial intelligence is an interdisciplinary degree offered by Khoury College of Computer Sciences and the College of Engineering. Descriptions of the concentrations offered in this degree are as follows:

- **Computer Vision—College of Engineering**
 - The computer vision concentration offers students the knowledge and skills to drive innovation at the intersection of new and emerging vision systems and AI, through utilizing AI and machine learning solutions for a wide range of applications including image enhancement/restoration, object recognition, navigation, graphics rendering, and pattern classification.
- **Continuous Process Engineering—College of Engineering**
 - The continuous process engineering concentration offers students the knowledge and skills to revolutionize how industrial processes are designed, monitored, and optimized. The program aims to prepare students to utilize AI and machine learning solutions to enhance process efficiency, predictive maintenance, and real-time decision making in industries such as chemicals, pharmaceuticals, and energy. Graduates will be prepared to integrate AI-driven solutions into continuous manufacturing environments to improve safety, sustainability, and productivity.
- **Energy Systems—College of Engineering**
 - The energy systems concentration offers students the knowledge and skills to drive innovation in sustainable and intelligent energy systems. Students examine how to utilize AI and machine learning solutions to support smart energy grid operations, integrate renewable energy sources, and create responsive and resilient systems.
- **Machine Learning—Khoury College of Computer Sciences**
 - The goal of the machine learning concentration is to provide students with practical, hands-on experience in designing, implementing, and optimizing machine learning models for real-world applications. The curriculum positions graduates to pursue roles that leverage AI to drive innovation and efficiency in a wide variety of industries and domains.
- **Robotics and Agent-Based Systems—Khoury College of Computer Sciences**
 - The goal of the robotics and agent-based systems concentration is to provide students with expertise in designing and developing intelligent robotic systems and autonomous agents capable of performing complex tasks in dynamic environments. The curriculum positions graduates to pursue roles that contribute to innovations in automation, human-robot interaction, and intelligent systems design.

Students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their college of admission.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative GPA of 3.000 or higher is required in the following:

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 5130	Applied Programming and Data Processing for AI	4
DADS 5200 or DS 5020	Mathematics for Machine Learning Introduction to Linear Algebra and Probability for Data Science	4
EECE 5644 or DADS 7275	Introduction to Machine Learning and Pattern Recognition Machine Learning and Data Analytics	4

Concentrations

Complete one of the following concentrations:

- Computer Vision (p. 165)—College of Engineering
- Continuous Process Engineering (p. 165)—College of Engineering
- Energy Systems (p. 165)—College of Engineering
- Machine Learning (p. 166)—Khoury College of Computer Sciences
- Robotics and Agent-Based Systems (p. 166)—Khoury College of Computer Sciences

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

COMPUTER VISION CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Complete 8 semester hours from the following:		8
EECE 5550	Mobile Robotics	
EECE 5554 or ME 5554	Robotics Sensing and Navigation	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
Complete 4 semester hours from the following:		4
EECE 5645	Parallel Processing for Data Analytics	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering	
Capstone		
EECE 7945	Master's Project	4

CONTINUOUS PROCESS ENGINEERING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Students without a chemical engineering degree are advised to choose the 510X courses, which serve as a bridge from other degrees.		
Complete 8 semester hours from the following:		8
CHME 5101 and CHME 5102	Fundamentals of Chemical Engineering: Fluid, Heat, and Mass Transfer and Fundamentals of Chemical Engineering: Thermodynamics and Kinetics	
CHME 5510 and CHME 5515	Fundamentals in Process Safety Engineering and Process Safety Engineering for Biotechnology and Pharmaceutical Industries	
CHME 7600 and CHME 7601	Pharmaceutical Engineering I and Pharmaceutical Engineering II	
Complete 4 semester hours from the following:		4
CHEM 5641 and CHME 7901	Computational Chemistry and Journal Club in Chemical Engineering	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5520	Designing for Process Safety	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
IE 7270	Intelligent Manufacturing	
PHIL 5010	AI Ethics	
PHSC 5900	AI in Drug Discovery and Development	
Capstone		
CHME 6580	Artificial Intelligence for Process Engineering Capstone	4

ENERGY SYSTEMS CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Complete 12 semester hours from the following:		12
CHME 5621	Electrochemical Engineering	
CHME 5692	Carbon Capture, Utilization, and Storage	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5700	Renewable Energy Development	
ENSY 5800	Applications of Artificial Intelligence in Energy Systems	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5374	Special Topics in Mechanical Engineering	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
PHIL 5010	AI Ethics	
Capstone		
ME 7945	Master's Project	4

MACHINE LEARNING CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
CS 5800	Algorithms	4
Complete 8 semester hours from the following:		8
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
Capstone		
Complete 4 semester hours from the following:		4
CS 6170	AI Capstone	
CS 8674	Master's Project	

ROBOTICS AND AGENT-BASED SYSTEMS CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
CS 5800	Algorithms	4
Complete 8 semester hours from the following:		8
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
Capstone		
Complete 4 semester hours from the following:		4
CS 6170	AI Capstone	
CS 8674	Master's Project	

Climate Science and Engineering, MS (Boston)**Overview**

The Master of Science in Climate Science and Engineering is offered jointly by the College of Engineering and the College of Science. The program provides training in the fundamental scientific processes that underpin the structure and dynamics of the climate, as well as the engineering strategies and technologies required for decarbonization and adaptation to climate change.

Incoming students will typically hold a bachelor's degree in a science, engineering, or related field. The program is designed to prepare students for climate-facing positions in the public or private sectors and can serve as a springboard for students interested in pursuing doctoral-level research. Students must take at least 12 semester hours of College of Science courses and at least 12 semester hours of College of Engineering courses, which includes a report, thesis, or coursework option.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Student should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Climate Science and Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Climate Science and Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership (p. 738), 12 semester hours of the certificate coursework may be applied to the restricted elective requirements of this program's coursework option. Of the remaining 20 semester hours required by this program, students must take 12 semester hours of College of Science courses (subject codes EEMB and ENVR) and 8 semester hours from College of Engineering courses (subject codes CIVE, EECE, ENSY, MATL, ME, and SBSY).

The Department of Civil and Environmental Engineering encourages students pursuing the Graduate Certificate in Engineering Leadership (p. 738) to complete their MS coursework requirements in their first year and their certificate requirements in their second year. Students who prefer to complete their certificate requirements in their first year are asked to speak with their MS degree advisor in advance.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. In order to ensure a balance of training across science and engineering, students must take at least 12 semester hours of College of Science courses (starting with EEMB, ENVR) and at least 12 semester hours of College of Engineering courses (starting with CIVE, EECE, ENSY, MATL, ME, SBSY) from the core requirements and restricted elective course options.

Core Requirements

Code	Title	Hours
Complete 20 semester hours from the core requirements listed below (any core course not used to meet this core course requirement can be taken as a restricted elective):		20
CIVE 5150 or ENVR 5150	Climate and Atmospheric Change	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
CIVE 5366	Air Quality Engineering and Science	
CIVE 5670 or ENVR 5670	Global Biogeochemistry	
CIVE 7110	Critical Infrastructure Resilience	
ENVR 5350	Sustainable Energy and Climate Solutions	
ENVR 5600	Coastal Processes, Adaptation, and Resilience	
ENVR 5800	Climate Adaptation and Nature-Based Solutions	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the restricted electives course list below. (p. 522)		12

REPORT OPTION

Code	Title	Hours
CIVE 7945 or EEMB 8984	Master's Project Research	4
Complete 8 semester hours from the restricted electives course list below. (p. 522)		8

THESIS OPTION

Code	Title	Hours
Complete CIVE 7945 and CIVE 7990 for 8 semester hours or complete EEMB 8984 twice for 8 semester hours:		8
CIVE 7945 and CIVE 7990	Master's Project and Thesis	
EEMB 8984	Research (Completed twice)	
Complete 4 semester hours from the restricted electives course list below. (p. 522)		4

In addition to completing the thesis course, College of Engineering students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Restricted Electives

Code	Title	Hours
CIVE 5280	Remote Sensing of the Environment	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7282	Coastal and Hydraulic Modeling	
CIVE 7385	Public Transportation	
CIVE 7392	Special Topics in Environmental Engineering	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ENVR 5210	Environmental Planning	
ENVR 5220	Ecosystem-Based Management	
ENVR 5563	Advanced Spatial Analysis	
INTL 5100	Climate and Development	
LAW 7634	Energy Law and Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5685	Solar Thermal Engineering	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
SBSY 5100	Sustainable Design and Technologies in Construction	
SBSY 5200	Sustainable Engineering Systems for Buildings	

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Data Science, MS (Boston)

Khoury College of Computer Sciences and the College of Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science—Align fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Engineering Theory and Modeling—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 113).

Data Science Core

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Programming with Data		
DS 5110	Essentials of Data Science	4
Algorithms		
CS 5800 or EECE 7205	Algorithms Fundamentals of Computer Engineering	4
Machine Learning		
CS 6140 or EECE 5644	Machine Learning Introduction to Machine Learning and Pattern Recognition	4
Interdisciplinary Capstone		
DS 5500	Data Science Capstone	4

Data Science Concentration Options

Complete one of the following concentrations:

- Computer Science (p. 170)—Khoury College of Computer Sciences
- Engineering Theory and Modeling (p.)—College of Engineering

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Complete 16 semester hours from the following: ¹		16
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	

CS 7140	Advanced Machine Learning
CS 7150	Deep Learning
CS 7180	Special Topics in Artificial Intelligence
CS 7200	Statistical Methods for Computer Science
CS 7250	Information Visualization: Theory and Applications
CS 7280	Special Topics in Database Management
CS 7290	Special Topics in Data Science
CS 7990	Thesis
CS 8674	Master's Project
DS 7995	Project

ENGINEERING THEORY AND MODELING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Foundational Courses		
Complete 4 semester hours from the following: ¹		4
DS 7995	Project	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7346	Probabilistic System Modeling and Analysis	
IE 6400	Foundations for Data Analytics Engineering	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
Translational and Advanced Courses		
Complete the remaining 12 semester hours from the following:		12
BIOE 5750	Modeling and Inference in Bioengineering	
BIOE 5880	Computational Methods in Systems Bioengineering	
BIOE 6200	Mathematical Methods in Bioengineering	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5645	Parallel Processing for Data Analytics	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7215	Introduction to Distributed Intelligence	
EECE 7223	Riemannian Optimization	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7945	Master's Project	
IE 5137	Computational Modeling in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	

IE 5630	Biosensor and Human Behavior Measurement
IE 5640	Data Mining for Engineering Applications
IE 6400	Foundations for Data Analytics Engineering
IE 6600	Computation and Visualization for Analytics
IE 6700	Data Management for Analytics
IE 6750	Data Warehousing and Integration
IE 7270	Intelligent Manufacturing
IE 7275	Data Mining in Engineering
IE 7280	Statistical Methods in Engineering
IE 7295	Applied Reinforcement Learning in Engineering
IE 7300	Statistical Learning for Engineering
IE 7500	Applied Natural Language Processing in Engineering
IE 7615	Neural Networks and Deep Learning

¹ Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional hour, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Data Science, MS—Align (Boston)

Khoury College of Computer Sciences and the College of Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science—Align fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

The Master of Science in Data Science—Align curriculum is specifically designed to prepare incoming students without any prior programming experience. During the first semester of year one, students are expected to take foundational courses in computer science fundamentals, as well as a course in data structures/discrete mathematics. During their second semester, students will take coursework in programming for data science, as well as linear algebra and probability.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Engineering Theory and Modeling—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 113).

Align Bridge Coursework

Students are required to complete all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Programming for Data Science		

DS 5010	Introduction to Programming for Data Science	4
Additional Align Coursework		
DS 5020	Introduction to Linear Algebra and Probability for Data Science	4

Data Science Core

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Programming with Data		
DS 5110	Essentials of Data Science	4
Algorithms		
CS 5800	Algorithms	4
or EECE 7205	Fundamentals of Computer Engineering	
Machine Learning		
CS 6140	Machine Learning	4
or EECE 5644	Introduction to Machine Learning and Pattern Recognition	
Interdisciplinary Capstone		
DS 5500	Data Science Capstone	4

Data Science Concentration Options

Complete one of the following concentrations:

- Computer Science (p. 173)—Khoury College of Computer Sciences
- Engineering Theory and Modeling (p.)—College of Engineering

Program Credit/GPA Requirements

40–48 total semester hours required

Minimum 3.000 GPA required

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Complete 16 semester hours from the following: ¹		16
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7250	Information Visualization: Theory and Applications	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
CS 7990	Thesis	

CS 8674	Master's Project
DS 7995	Project

ENGINEERING THEORY AND MODELING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Foundational Courses		
Complete 4 semester hours from the following: ¹		4
DS 7995	Project	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7346	Probabilistic System Modeling and Analysis	
IE 6400	Foundations for Data Analytics Engineering	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
Translational and Advanced Courses		
Complete the remaining 12 semester hours from the following:		12
BIOE 5750	Modeling and Inference in Bioengineering	
BIOE 5880	Computational Methods in Systems Bioengineering	
BIOE 6200	Mathematical Methods in Bioengineering	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5645	Parallel Processing for Data Analytics	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7215	Introduction to Distributed Intelligence	
EECE 7223	Riemannian Optimization	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7945	Master's Project	
IE 5137	Computational Modeling in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	
IE 5630	Biosensor and Human Behavior Measurement	
IE 5640	Data Mining for Engineering Applications	
IE 6400	Foundations for Data Analytics Engineering	
IE 6600	Computation and Visualization for Analytics	
IE 6700	Data Management for Analytics	
IE 6750	Data Warehousing and Integration	
IE 7270	Intelligent Manufacturing	
IE 7275	Data Mining in Engineering	

IE 7280	Statistical Methods in Engineering
IE 7295	Applied Reinforcement Learning in Engineering
IE 7300	Statistical Learning for Engineering
IE 7500	Applied Natural Language Processing in Engineering
IE 7615	Neural Networks and Deep Learning

¹ Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional 1 semester hour, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

Extended Realities, MS (Boston)

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality.

This program is structured to allow students flexibility and specialization to choose a path that matches their interest. Students have an opportunity to focus on a concentration area that matches their professional background and aspirations.

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their home college. The concentrations are associated with the following colleges:

- Khoury College of Computer Sciences
 - Artificial Intelligence
 - Human Computer Interaction
- D'Amore-McKim School of Business
 - Entrepreneurship
 - Marketing
- Bouvé College of Health Sciences
 - Human Movement Science
- College of Social Sciences and Humanities
 - Information Ethics
 - Public History
- College of Engineering
 - Wireless Networking
- College of Arts, Media and Design
 - XR and Design
 - XR and Games
 - XR and Media

The Master of Science in Extended Realities welcomes students from a diverse range of backgrounds because of the applications of XR technology used in many disciplines and industries including medicine, business, entertainment, architecture, and journalism.

Some concentrations may require a technical background and are noted in the requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Extended Reality Core

Code	Title	Hours
Required Courses		
EXRE 5010 and EXRE 5011	Immersive Media: Extended Realities (XR) History, Theory, and Impact and Seminar for EXRE 5010	5
EXRE 5020	Developing Extended Realities (XR)	4
EXRE 5030	Designing Extended Realities (XR)	4
EXRE 7500 or EXRE 7990	Extended Realities (XR) Project Thesis	4
GSND 5122	Business Models in the Game Industry	1

Extended Reality Concentration Options

Complete one of the following options:

- Artificial Intelligence (p. 176)—Khoury College of Computer Sciences
- Entrepreneurship (p. 176)—D'Amore-McKim School of Business
- Human Computer Interaction (p. 176)—Khoury College of Computer Sciences
- Human Movement Science (p. 176)—Bouv  College of Health Sciences
- Information Ethics (p. 177)—College of Social Sciences and Humanities
- Marketing (p. 177)—D'Amore-McKim School of Business
- Public History (p. 177)—College of Social Sciences and Humanities
- Wireless Networking (p. 178)—College of Engineering
- XR and Design (p. 178)—College of Arts, Media and Design
- XR and Games (p. 178)—College of Arts, Media and Design
- XR and Media (p. 178)—College of Arts, Media and Design

Program Credit/GPA Requirements

34 total semester hours required. Some concentrations may require more than 34 semester hours to complete.

Minimum 3.000 GPA required

CONCENTRATION IN ARTIFICIAL INTELLIGENCE—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Requires a background in computer science.		
CS 5097	Mixed Reality	4
CS 5100	Foundations of Artificial Intelligence	4
CS 6120	Natural Language Processing	4
CS 6140	Machine Learning	4
or DS 5220	Supervised Machine Learning and Learning Theory	

CONCENTRATION IN ENTREPRENEURSHIP—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
INNO 6200	Enterprise Growth and Innovation	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
GE 5030	Iterative Product Prototyping for Engineers	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

CONCENTRATION IN HUMAN COMPUTER INTERACTION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Required Courses		
CS 5340	Computer/Human Interaction	4
Electives		
Complete 12 semester hours from the following:		12
ARTG 5710	Design for Dignity	
CS 5097	Mixed Reality	

CS 5170	Artificial Intelligence for Human-Computer Interaction
CS 6350	Empirical Research Methods
CS 7390	Special Topics in Human-Centered Computing
GSND 6340	Biometrics of Design

CONCENTRATION IN HUMAN MOVEMENT SCIENCE—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
Required Courses		
GSND 6340	Biometrics of Design	4
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
Electives		
Complete 7–8 semester hours from the following:		7-8
PT 5133	Kinesiology	
PT 5150	Motor Control, Development, and Learning	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 5410	Functional Human Neuroanatomy	
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	
PT 7020	Technologies in Movement and Rehabilitation Science	

CONCENTRATION IN INFORMATION ETHICS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
Electives		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MARKETING—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

CONCENTRATION IN PUBLIC HISTORY—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
HIST 5237	Issues and Methods in Public History	4
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1 (to be taken twice)	
Electives		
Complete 8 semester hours from the following:		8
HIST 5241	Exhibits and Museums	
HIST 7250	Topics in Public History (Public History and Slavery)	
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)	

CONCENTRATION IN WIRELESS NETWORKING—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
EECE 5512	Networked XR Systems	
EECE 7374	Fundamentals of Computer Networks	
Electives		
Complete 8 semester hours from the following:		8
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	

CONCENTRATION IN XR AND DESIGN—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5640	Prototyping for Experience Design	4
EXRE 6500	Extended Realities (XR) Studio	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN XR AND GAMES—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
Electives		
Complete 8 semester hours from the following:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6001	Advanced Topics in Game Science	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6330	Player Experience	
GSND 6340	Biometrics of Design	

GSND 6350	Data-Driven Game Design
GSND 6460	Generative Game Design

CONCENTRATION IN XR AND MEDIA—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics	
JRNL 6341	Telling Your Story with Data	

Plan of Study

Sample Plan of Study

The following is a sample plan of study for a student in the Concentration in XR and Games.

Year 1			
Fall	Hours	Spring	Hours
EXRE 5010 and EXRE 5011		5 EXRE 5030	4
EXRE 5020		4 GSND 5110 and GSND 5111	5
		9	9
Year 2			
Fall	Hours	Spring	Hours
EXRE 6500		4 EXRE 7500	4
GSND 5122		1 XR and games elective 2	4
XR and games elective 1		4	
		9	8
Total Hours: 35			

Product Development, MS (Boston)

Product development is in demand across many technology industries and is widely thought to be the engine of innovation. The Sherman Center for Entrepreneurial Engineering Education is uniquely positioned to offer students a combination of product process and technical skills. The mission of the center is to enable interdisciplinary student entrepreneurship in the broadest sense by providing education about tools, concepts, and resources to foster creativity and the ability to develop commercially viable ideas.

Products ranging from smart devices to the Internet of Things to software as a service all require people with product development skills. These positions guide product innovation and lead in crafting products for users. A look at any careers page for any technology firm currently hiring shows many positions open for individuals that have a mix of technical and product development knowledge.

The Master of Science in Product Development program contains a core of courses that span the product development cycle and then allows students to customize the rest of their degree to fit their chosen industry or path. The core courses cover topics such as customer acquisition, technical market analysis, product life cycle, intellectual property, prototyping, iterative development, product design, user testing, and manufacturing.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
GE 5010	Customer-Driven Technical Innovation for Engineers	4
GE 5020	Engineering Product Design Methodology	4

GE 5030	Iterative Product Prototyping for Engineers	4
GE 5100	Product Development for Engineers	4

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the course list below. (p. 766)		16

PROJECT OPTION

Code	Title	Hours
GE 7945	Master's Project	4
Complete 12 semester hours from the course list below. (p. 766)		12

THESIS OPTION

Code	Title	Hours
GE 7945	Master's Project	4
GE 7990	Thesis	4
Complete 8 semester hours from the course list below. (p. 766)		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

COURSE LIST

Code	Title	Hours
Any course in the following list will serve as an elective course, provided the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the program director.		
College of Engineering		
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
BIOE 5810	Design of Biomedical Instrumentation	
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 7280	User Experience Design and Testing	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5666	Digital Signal Processing	
IE 5617	Lean Concepts and Applications	
IE 5630	Biosensor and Human Behavior Measurement	
IE 6200	Engineering Probability and Statistics	

IE 6500	Human Performance
IE 7200	Supply Chain Engineering
IE 7270	Intelligent Manufacturing
INFO 6660	Business Ethics and Intellectual Property for Engineers
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5650	Advanced Mechanics of Materials
ME 5659	Control Systems Engineering
TELE 6510	Fundamentals of the Internet of Things
TELE 6530	Connected Devices
D'Amore McKim School of Business	
ENTR 6240	Emerging and Disruptive Technologies
ENTR 6250	Lean Design and Development
INNO 6200	Enterprise Growth and Innovation
INNO 6230	Platform Innovation
MKTG 6200	Creating and Sustaining Customer Markets
College of Arts, Media and Design	
ARTG 5120	Research Methods for Design
ARTG 5310	Visual Cognition
ARTG 5610	Design Systems
ARTG 5640	Prototyping for Experience Design
ARTG 6310	Design for Behavior and Experience
GSND 5110	Game Design and Analysis
GSND 5122	Business Models in the Game Industry
GSND 5130	Mixed Research Methods for Games
GSND 6320	Psychology of Play
GSND 6340	Biometrics of Design
Bouvé College of Health Sciences	
PT 5321	Applications of Biomechanics in Human Function and Movement
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation

AI Applications, Graduate Certificate (Boston)

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- College of Social Sciences and Humanities
- D'Amore-McKim School of Business
- Mills College at Northeastern

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

Experiential Courses

Code	Title	Hours
Complete 4 semester hours from the following:		4
CRIM 6600	Justice, Technology, and AI	
EDUT 6150	AI in Education	
HLTH 5800	AI Across the Health Sciences	
IE 5640	Data Mining for Engineering Applications	
JRNL 6460	AI in Media Industries	
MISM 6250	Strategic AI for Business	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

AI Applications, Graduate Certificate (Silicon Valley)

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by the College of Engineering and will follow all policies associated with the College of Engineering.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
or EECE 5644	Introduction to Machine Learning and Pattern Recognition	
PHIL 5110	Responsible AI	4

Experiential Course

Code	Title	Hours
IE 5640	Data Mining for Engineering Applications	4

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Product Management, Graduate Certificate (Boston)

The Graduate Certificate in Product Management is designed for students with undergraduate degrees in a wide range of fields—including computer science, engineering, economics, business administration, design, and psychology—who want to build the skills necessary for success as product managers. This certificate equips students with the expertise to excel in this dynamic field, whether they are early career professionals, transitioning

into product roles, or looking to differentiate themselves in a competitive job market. The program provides a flexible, cost-effective alternative to a full MS program while offering hands-on learning experiences.

Curriculum and Structure

This interdisciplinary certificate offers a structured yet adaptable curriculum that balances foundational knowledge with practical, industry-relevant skills.

The program consists of four courses (12–13 semester hours total):

- Three core courses covering fundamental concepts across key product management functions
- One experiential course (1 credit) providing hands-on learning opportunities tailored to students' backgrounds and career goals in product management

This certificate allows students to gain real-world experience, develop in-demand skills, and enhance their career opportunities within a streamlined, flexible structure.

Admissions and College Affiliation

Students are admitted to the certificate program through one of the following colleges and follow the academic policies of their home college:

- College of Arts, Media and Design
- College of Engineering
- D'Amore-McKim School of Business
- Office of the Provost and College of Professional Studies¹

This certificate provides a fast, flexible, and practical pathway for students looking to build expertise in product management while benefiting from Northeastern University's strong academic and professional support network.

¹ Program Structure and Transition

- For the 2025–2026 academic year, the Graduate Certificate in Product Management is being offered as a collaboration between the College of Professional Studies and the Office of the Provost. During this period, students will follow Northeastern's graduate academic calendar and be governed by the academic policies and procedures outlined in the university's *Graduate Catalog*.
- While designated under the Office of the Provost, students will receive full academic and student support services from the College of Professional Studies including academic advising, co-op and career advising, and access to the International Tutoring Center.
- Beginning in the 2026–2027 academic year, the certificate program will transition fully to the College of Professional Studies. At that time, students will be officially designated under CPS in the academic system of record and governed by its academic policies as outlined in the university's *Graduate Catalog*.

Program Requirements

Requirements

Code	Title	Hours
Fundamental Concepts		
ARTG 5600	Experience Design Studio 1: Principles	4
EMGT 6750 or PDM 6000	Advanced Product Management Foundations of Product Management	3-4
INNO 6409	Innovation Portfolio Management	4
Experiential Course		
Complete one of the following:		1
ARTG 5540	Design and Product Management	
EMGT 6760	Technical Product Management	
INNO 6411	Product Innovation Management	
PDM 6940	Product Analytics	

Program Credit/GPA Requirement

12 total semester hours required (additional hours may be required based on student choice of course options)

Minimum 3.000 GPA required

Graduate Certificate Programs

The College of Engineering offers numerous graduate engineering certificates for professionals at every career stage. These certificates may be completed as stand-alone credentials or in combination with a graduate degree. They typically consist of 16 to 20 semester hours and allow the learner to quickly gain a credential to advance their skills and knowledge, meet an emerging career market need, or add to their professional preparation. In many cases, graduate coursework completed as part of a certificate program may be applied toward a graduate degree in the College of Engineering. Whether you are a working professional seeking new career opportunities, or a full-time graduate student looking to enhance your credentials, our broad and continuously expanding range of certificates are ready to help move your preparation forward.

Programs

The College of Engineering offers numerous graduate certificates that may be completed alone or in combination with an MS degree. Please see Certificates Policies and Procedures (p. 464) for detailed information regarding College of Engineering graduate certificates.

Chemical Engineering

- Process Safety Engineering (p. 514) (Boston)

Civil and Environmental Engineering

- Climate and Engineering (p. 543) (Boston)
- Sustainability Engineering (p. 544) (Boston)

Mechanical and Industrial Engineering

- AI Applications (p. 190) (Boston)
- AI Applications (p. 191) (Silicon Valley)
- Data Analytics Engineering (p. 681) (Boston)
- Data Analytics Engineering (p. 681)—Online (p. 682)
- Digital Platforms for Service Innovation (p. 682) (Boston)
- Energy Systems (p. 684) (Boston)
- Energy Systems Management (p. 684) (Boston)
- Product Management (p. 192) (Boston)
- Renewable Energy (p. 688) (Boston)
- Sustainable Energy Systems (p. 690) (Boston)

Engineering Business

- Engineering Business (p. 685) (Boston)

Engineering Management

- Engineering Economic Decision Making (p. 687) (Boston)
- Engineering Management (p. 687) (Boston)
- Lean Six Sigma (p. 688) (Boston)
- Supply Chain Engineering Management (p. 689) (Boston)
- Technology Systems Management (p. 690) (Boston)

Gordon Institute of Engineering Leadership

- Engineering Leadership (p. 738) (Boston)

Multidisciplinary

- Blockchain and Smart Contract Engineering (p. 737) (Boston)
- Blockchain and Smart Contract Engineering (p. 737) (Arlington)
- Medical Software Engineering (p. 740) (Boston)
- Software Engineering Systems (p. 689) (Boston)
- Software Engineering Systems (p. 741) (Arlington)

Telecommunication Networks

- Broadband Wireless Systems (p. 738) (Boston)
- IP Telephony Systems (p. 740) (Boston)

Bouvé College of Health Sciences

Website (<https://bouve.northeastern.edu/>)

Carmen C. Sceppa, MD, PhD, FGSA, Dean

Jennifer Kirwin, PharmD, BCPS, FNAP, Senior Associate Dean of Academic Affairs

Clinical Professor—Department of Pharmacy and Health Systems Sciences, School of Pharmacy and Pharmaceutical Sciences

Office of the Dean

215 Behrakis Health Sciences Center

617.373.3323

Bouve_College_of_Health_Sciences@northeastern.edu (Bouve_College_of_Health_Sciences@northeastern.edu)

Office of Student Services

120 Behrakis Health Sciences Center

617.373.3320

BouveOGSS@northeastern.edu (BouveOGSS@northeastern.edu)

The Bouvé College of Health Sciences strongly supports the mission of Northeastern University as a practice-oriented, student-centered, experiential research institution. The college is committed to the goals of the university, which include excellence in education, research, scholarship, clinical practice, experiential learning, access to educational opportunities, and a strong professional orientation.

Bouvé offers students an education in health, health profession fields, and public health that features a curriculum of highly relevant, closely integrated, basic and applied courses in the physical, biological, behavioral, social, environmental, and health systems sciences. Students engage in interprofessional patient care, interdisciplinary translational research, and experiential learning opportunities through service-learning, research, and global experiences.

Bouvé leverages interdisciplinary and interprofessional collaboration to tackle the world's most pressing health challenges. The college seeks to prepare students to become clinicians, researchers, and leaders in healthcare and in the promotion of health of individuals and populations.

Students are provided a broad range of services and programs to ensure their academic success and professional development. Faculty are deeply committed to student success, as students interact with world-class healthcare and educational institutions nationally and globally, to advance health for all.

See Bouvé College Academic Policies and Procedures (p. 772).

Academic Policies and Procedures

Northeastern University has published Regulations and Requirements for all graduate programs here.

Program Status and Progression

All degree requirements must be completed within seven years of matriculation, although individual academic programs may require completion in a shorter time frame. Each student is responsible for reviewing the requirements for their particular program. A student's failure or inability to register does not extend the amount of time allowed to complete the program. Students should be registered by the first week of each semester (fall, spring, and, where indicated, summer). Course credits earned in programs of graduate study are valid for a maximum of seven years. A student may request an extension of these time frames from the program director and the Bouvé associate dean for academic affairs.

In order to progress in clinical courses that are sequenced, a student must receive a passing grade in all prior courses in the sequence. In the event that a student fails a clinical course that is not part of a sequence, progression is at the discretion of the student's academic advisor and/or the program director. When a student fails a clinical course that is part of a sequence of courses, the course instructor must notify the Bouvé Office of Student Services. Course material related to the student's failure (e.g., examination reports, clinical reports) must be made available to the student for review.

Annual Review for PhD Students

The academic progress of each PhD student will be evaluated through an annual review. A copy of each review shall be submitted to the student and the graduate office. If the annual review reports that a student is not making sufficient academic progress, the PhD student will be placed on academic probation. After two consecutive semesters on academic probation, the student may be dismissed from the program. See additional requirements that apply to PhD programs here.

Conditional Acceptance

A student who is accepted conditionally to a graduate program at Bouvé College of Health Sciences must meet the conditions set in the acceptance letter before matriculating into the program. Examples of conditions include receipt of official verification of previous degree completion, completion of missing prerequisite courses, receipt of a missing recommendation, receipt of standardized test scores, and translation of international documents. Students who fail to meet the conditions of their acceptance may be subject to program dismissal.

Admission as a Special Student

Special students are enrolled on a part-time basis (for no more than 6 semester hours per semester) and may accumulate a maximum of 12 semester hours over time. Students interested in taking more than 12 semester hours must make a formal application to a degree program through Northeastern's online application portal (<https://bouve.northeastern.edu/admissions/graduate-admissions/>). Special students who do not register for four consecutive semesters (excluding summer semesters) will be subject to review and possible withdrawal by the Bouvé College of Health Sciences Office of Student Services. Please note, some courses require approval before registration.

Program Extension Procedures

Students may seek an extension to complete their program of study only under documented extenuating circumstances. To request an extension, the student must submit the Graduate Program Status Change form along with an action plan to complete the degree requirements to the program director with a copy to the Bouvé Office of Student Services for approval.

Leave of Absence and University Withdrawal

Refer to Leaves of Absence and University Withdrawal in this catalog for more information and policies on leaves of absence and university withdrawals. Individual programs may have additional procedures related to leaves of absence. Consult the program's overview and requirements page in this catalog in addition to the information above. Faculty members are not responsible for notifying the university of a student's withdrawal. For information concerning refund policies, please refer to the Student Financial Services refund page here (<https://studentfinance.northeastern.edu/policies-procedures/refunds-from-credit-balances-withdrawals/>).

Course Substitution

A student must obtain approval from their program director to substitute a course. The student must provide official transcripts of completed coursework, accompanied by the respective course syllabi, to their program director. Substitutions will only be made for courses of equivalent credit hours. Once informally approved, the program director must submit a Course Substitution form for processing.

Transfer Credit

For general regulations concerning transfer credit in Northeastern's graduate degree programs, please visit Regulations and Requirements for All Graduate Degree Programs.

Students who wish to take a course for transfer at another institution while enrolled at Bouvé should first receive preapproval from their academic advisor and the Bouvé Office of Student Services. Transfer credits from other institutions (or other programs within the university) will only be accepted at the discretion of the student's program. The Graduate Petition to Transfer Credit form can be found at the Office of the University Registrar.

A Bouvé student may not complete coursework at another institution during their last term intending to transfer that credit back to Northeastern to complete the program.

Academic Standing

Academic standing in Bouvé is determined by the student's cumulative grade-point average and performance in required academic and clinical courses. All Bouvé students are expected to maintain a cumulative GPA of 3.000 each semester to remain in good academic standing and to progress toward graduation. Students who do not maintain a cumulative GPA of 3.000 each semester will be placed on academic probation—see below.

Each program has its own minimum grade requirements. Please review the program's requirements page in this catalog for details.

Graduate Student Academic Petitions

Students must submit a petition to their program's academic standing committee, graduate committee, or program director (as applicable) to request:

- A leave of absence.
- A transfer or waiver of credits or preapproval for the course to be taken for transfer (see Graduate Petition to Transfer Credit).
- Directed study (see Individual Instruction Registration).
- A waiver of policy (see department-specific appeal form (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Bouv%C3%A9-Student-Forms.aspx>)).
- A change in program, program status (e.g., full-time to part-time or vice versa), adding or removing concentration, program extension, or change of graduation date. Students should discuss with the program director and the program director will submit a Graduate Program Status Change form.
- A different course of action regarding their academic standing, progression, probation, or dismissal (see department-specific appeal form (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Bouv%C3%A9-Student-Forms.aspx>)).

The petition must include all relevant information. Students may be required to provide extra documentation, such as official transcripts and/or course descriptions. A copy of this action is filed in the student's permanent record in the Bouvé College of Health Sciences Office of Student Services.

Academic Probation Policy

Academic probation is a period of time when a student must address and remediate academic deficiencies.

A Bouvé graduate student may repeat a course only once to achieve a passing grade and may repeat only two courses during the entire program of study. A student may be on probation for only two semesters, or until the course is offered again, unless the advisor approves an action plan that specifies a longer (but definite) period. A student may only be placed on probation twice during enrollment in Bouvé and must correct all deficiencies, as specified, in each respective action plan during the applicable probationary period. Failure to remediate the deficiency within the agreed time may result in dismissal from the program. During the period of probation, the student must earn a GPA of 3.000 or better each semester, or the student is subject to dismissal from Bouvé. Note that individual graduate programs may have additional requirements that must be included in the probation action plan.

A student will be removed from academic probation after having attained a cumulative GPA of 3.000, earned a passing grade in a repeated course, and/or demonstrated satisfactory performance in a clinical course.

Collegewide Academic Probation Procedure

Academic standing is determined at the conclusion of every term, and students on academic probation are notified via email.

Students on probation are required to meet with their advisor before the end of week 2 of their probationary semester to complete an Academic Probation Contract (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Bouv%C3%A9-Student-Forms.aspx>).

Once the contract is completed and signed, students are required to submit it to both their program and their Student Services designee, no later than the end of week 3 of the probationary term. Failure to submit an Academic Probation Contract in a timely manner may result in dismissal from the college.

The program will review the student's contract and provide any additional feedback or recommendations for the student and return a signed copy to the student.

Advisors will meet with students on academic probation throughout the semester to benchmark progress and assess compliance with the contract during weeks 4, 10, and 12.

A review of the student's progress will occur at the end of the term.

- If a student returns to good standing, they will no longer be on academic probation.
- If a student does not return to good academic standing, their compliance with their contract will be reviewed:
 - If a student was compliant with the contract, they will be required to submit a second Academic Probation Contract to the unit.
 - If a student did not comply with the contract, they may be dismissed from Bouvé with an option to appeal.

Academic Dismissal

A student may be dismissed from a graduate program when they have failed to maintain academic requirements or have violated a policy that specifies immediate dismissal. All students shall have an opportunity to correct academic deficiencies during an appropriate probationary period before dismissal is instituted, except when the policy specifies "immediate dismissal."

Students may be subject to dismissal from a program under the following conditions. (*Note:* Additional requirements that are not included in this list, but are specific to the student's major, may also apply.)

- The student exhibits unethical behavior or misconduct in their academic program, practicum, internship, or research.
- The faculty instructor and/or the clinical supervisor determines that the student has demonstrated unsafe or inappropriate behavior in a clinical setting.
- The student does not register for at least one class for two consecutive semesters and does not have an approved leave of absence.
- The student has a cumulative GPA below 3.000 at the end of the probationary period specified by the action plan.
- The student does not demonstrate satisfactory performance in achieving the objectives of a clinical course.
- The student fails to meet all the requirements of the program within the specified time limit mandated by the program and has not been approved for a formal extension.
- The student in a PhD program fails to successfully complete the PhD qualifying/comprehensive exams successfully as stipulated by the program.
- The student fails to progress satisfactorily in research or fails to identify a committee for their thesis or dissertation within the time specified by the policies of the specific program.
- The student has failed to file an action plan within one month of notification of probation.
- The student has failed to meet the requirements of the action plan including any requirements specific to the student's major.
- The student has failed three courses or has failed the same course twice.
- The student has failed to make progress toward degree completion.

DISMISSAL PROCEDURES

Dismissal of a student from a program is initiated by the program director once the basis for the dismissal is provided to and reviewed by the Bouvé Office of Student Services. The program director will then notify the student of the dismissal. When a student is dismissed from the university, they are not permitted to remain registered for courses in the immediate next academic term. If the university dismissal is successfully appealed, a student may register for classes in the following academic term.

Collegewide Appeals

Students who believe that they were erroneously, capriciously, or otherwise unfairly treated in an academic, professional code of conduct, or cooperative education decision may petition to appeal the decision.

Details about the process for undergraduate students may be found in Academic Appeals Policies and Procedures (<https://catalog.northeastern.edu/undergraduate/academic-policies-procedures/academic-appeals-policies-procedures/>) in the undergraduate section of this catalog, supplemented by the college-specific policies and procedures below.

Details about the process for graduate students may be found in Academic Appeals Policies and Procedures (p. 133) in the graduate section of this catalog, supplemented by the college-specific policies and procedures below.

For appeals of decisions concerning academic standing, progression, or co-op, students should discuss their concerns with the academic advisor and prepare an appeal statement for submission to the unit level as shown in the step below. Bouvé undecided students should begin at Step 2, below.

For appeals concerning a course grade, students should discuss their concerns with the course instructor offering the course as outlined in the University Academic Appeals Policies and Procedures (<https://catalog.northeastern.edu/undergraduate/academic-policies-procedures/academic-appeals-policies-procedures/>). If the concern remains unresolved after these conversations with your faculty, the student should prepare an appeal to the department chair or school dean level—see Step 2, below.

For appeals concerning a professional code of conduct determination (when applicable to a student's program or major), the student should follow the process outlined in the Bouvé College of Health Sciences Code of Professional Conduct policy (in the graduate (p.) and undergraduate (<https://catalog.northeastern.edu/undergraduate/health-sciences/academic-policies-procedures/#:~:text=Bouv  College of Health Sciences Code of Professional Conduct>) sections of this catalog).

Disability Access Services (<https://disabilityaccessservices.northeastern.edu/>) provides an appeal process for students with disabilities who believe their accommodation requests were unduly denied. Appeals arising from allegations of discrimination or harassment on the basis of a protected category should be referred to the Office for University Equity and Compliance (<https://ouec.northeastern.edu/>). For appeals concerning student conduct, including academic integrity, please refer to the process outlined in the University Code of Student Conduct.

If the concern remains unresolved after informal discussions or if the concern pertains to a determination as outlined above, the student should prepare and submit an appeal statement. Students are encouraged to work with their advisor to complete the necessary forms.

STEP 1: BCHS UNIT-LEVEL APPEAL

When appealing a decision to the unit level, students should submit a request to appeal linked here (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Bouv%C3%A9-Student-Forms.aspx>) and submit the appeal statement within 28 calendar days from the day when the academic determination is made available to the student. The unit-level Academic Standing Committee must provide the student with a written report of the finding(s) and decision within 10 business days according to their established procedures.

STEP 2: DEPARTMENT CHAIR- OR SCHOOL DEAN-LEVEL APPEAL

Appeals of course grades should be requested with the College Grade Appeal form linked here within 28 calendar days of the posting of the grade in question. If the student believes they have been erroneously, capriciously, or otherwise unfairly treated with a unit-level committee's decision, they may pursue a secondary appeal to the next level as specified below:

School of Clinical and Rehabilitation Sciences: Department chair of the unit offering the course or major/program

School of Community Health and Behavioral Sciences: Department chair of the unit offering the course or major/program

School of Nursing: School dean

School of Pharmacy and Pharmaceutical Sciences: School dean

Bouv  Undecided: BCHS associate dean of academic affairs

The student must request the appeal by contacting the specified office in writing via the school dean/department chair-level appeal form (see Higher Level Appeals forms (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Bouv%C3%A9-Student-Forms.aspx>)) within 10 business days of receiving the report from the previous step. After consideration, the department chair or school dean, or their representative, shall provide the student and involved faculty member with a written report of their finding(s) and decision within 10 business days of receiving the appeal request.

STEP 3. COLLEGE-LEVEL APPEAL

If the student is not satisfied with the disposition of the matter at the previous step, they may proceed with the appeal to the college dean's office through the BCHS Academic Affairs Committee (AAC). The BCHS AAC hears cases that have been unsatisfactorily resolved at the prior school and unit levels for "students who believe that they have been erroneously, capriciously, or otherwise unfairly treated" or may directly hear appeals concerning course grades or when a unit does not have a unit-level committee. For all college-level appeals, the student must request an appeal hearing in writing via the Academic Affairs Committee Appeal form (see Higher Level Appeals forms (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Bouv%C3%A9-Student-Forms.aspx>)) within 10 business days of receiving the report from the previous step.

Processes for College-Level Appeals to the BCHS AAC:

- Students wishing to bring an appeal before the college AAC should first consult with their appointed academic advisor, or when the appeal involves the academic advisor, with the assistant dean of student services.
- The chair of the college AAC will convene the college appeals panel from among the regular members of the BCHS AAC. The appeals panel will include three voting members of the BCHS AAC that appropriately represent the breadth and depth of programs within the college. At minimum, two schools will be represented on the panel and at least one member who teaches within a similar degree-level program. Members of the panel shall have no known conflicts of interest with the student. The assistant dean of student services and the chair of the AAC will attend the appeal panel hearing as nonvoting members.
- A chair for the college appeal panel shall be selected from among the panel members and is responsible for producing a formal recommendation of the committee for communication to the college dean.
- The chair of the AAC will be responsible for scheduling the meeting, notifying the student and other participants in a timely manner so they may attend, and keeping and archiving records of the proceedings according to committee procedures.
- The chair of the college appeal panel will notify the college dean of the committee's findings and recommendation. The college dean will have the final decision.
- The college dean will notify the student and other relevant parties of the decision in writing no later than 10 business days after receiving the appeal request.

STEP 4. UNIVERSITY-LEVEL APPEAL

Some determinations may be appealed beyond the college level. Refer to the undergraduate and graduate appeals processes linked above for more information. Decisions concerning admission or readmission into a major or program, dismissals, and matters related to co-op employment (other than grades received) cannot be appealed beyond the college level. Please note, while major or program dismissals cannot be appealed beyond the college level, underlying academic judgments that led to a dismissal may be.

Graduation Policies**PROGRAMS THAT INCLUDE COMPLETION OF A THESIS**

Students completing a thesis as part of the program's academic requirements are required to complete the following at least five business days before the final grade submission deadline for the academic term:

- Upon successful defense of the thesis, the student must have the Thesis Approval form signed by the members of the thesis committee and approved by a representative from the Bouvé Office of Student Services.
- Students must submit an electronic copy of the thesis to ProQuest, following the directions outlined on the University Library website.

COMPLETION OF PHD PROGRAMS

The PhD hooding and degree conferral ceremony is only held during the spring semester. A PhD student may not participate in the ceremony until they have successfully defended their dissertation and completed all academic requirements.

Students completing a dissertation must complete the following at least five business days before the final grade submission deadline for the academic term:

- Upon a successful defense of the dissertation, the student must have the Dissertation Approval form signed by the dissertation committee members.
 - The student must submit an electronic copy of the dissertation to ProQuest, following the directions outlined in the University Library website.
 - The student must complete the PhD Exit form, at which time the Dissertation Approval form will be approved.
-

Bouvé College of Health Sciences Code of Professional Conduct

All students are expected to adhere to the Northeastern University Code of Student Conduct (p. 96). Additionally, students in the following schools or departments are expected to adhere to the Bouvé College of Health Sciences Code of Professional Conduct as described below:

Department of Applied Psychology (all programs)

Department of Communication Sciences and Disorders (all programs)

Department of Medical Sciences (all programs)

Department of Physical Therapy, Movement, and Rehabilitation Sciences (all programs)

School of Nursing (all programs)

School of Pharmacy and Pharmaceutical Sciences (all programs)

Healthcare and research professionals are required to adhere to rigorous standards of professional behavior. Bouvé emphasizes professionalism as part of the academic experience, ensuring that students graduate with adequate knowledge, skills, attitudes, and behaviors necessary for professional practice as healthcare and/or research team members.

Students are expected to demonstrate professional behavior in all academic, experiential (including clinical, cooperative education, and research), and extracurricular settings and activities, on and off campus. This Code of Professional Conduct applies to any situation affecting a student's fitness for continued enrollment or entry into professional practice.

Students must comply with the Northeastern University Code of Student Conduct (p. 96) and all other published university, college, and clinical or program policies. In addition, students in the abovementioned Bouvé departments or programs are expected to adhere to the following list of expected professional behaviors. By adhering to these expectations, students will contribute to a professional and respectful environment that fosters learning, collaboration, and the highest standards of academic and professional excellence:

SELF-GROWTH AND CARE

- Address and correct inappropriate behavior.
- Be open to and actively seek constructive feedback to improve performance.
- Demonstrate awareness of one's limitations.
- Display willingness to implement recommendations from faculty and others to enhance learning and performance.

ACCOUNTABILITY, INITIATIVE, RESPONSIBILITY, AND SENSE OF DUTY

- Show initiative and accountability in academic and professional roles.
- Collaborate effectively within healthcare and research teams.
- Exhibit a strong sense of duty and responsibility in all professional undertakings.
- Establish and maintain appropriate boundaries with patients, family members, community-based mentors, students, faculty, and staff.
- Complete tasks and responsibilities in a timely and reliable manner.
- Obtain permission before bringing family members, guests, and/or pets to the learning/research environment or professional academic activities.

RESPECT FOR OTHERS

- Respect the rights of others in both academic and professional settings while demonstrating compassion and respect in interactions with others.
- Demonstrate respect for all individuals, regardless of race, gender, religion, sexual orientation, age, or socioeconomic status.
- Demonstrate cultural humility with openness and responsiveness to the ethnic and cultural backgrounds of others.
- Respond to patient or participant needs in a timely, safe, and effective manner.
- Participate in a manner that is respectful and conducive to learning.
- Avoid causing disruptions that make it more difficult for others to learn and work.

PROFESSIONAL APPEARANCE

- Dress appropriately for professional settings, including patient care and research environments.

INTEGRITY AND TRUSTWORTHINESS

- Maintain the highest level of integrity during all academic, nonacademic, research, and extracurricular activities.
- Uphold the confidentiality rights of patients/clients and/or participants in accordance with university policy and the Health Insurance Portability and Accountability Act and other relevant laws and policies.
- Provide accurate and truthful information and operate within the scope of one's role and responsibilities in all academic, professional, research, and administrative settings.
- Act in the best interest of patients and patient safety.
- Establish and maintain appropriate rapport and show sensitivity to the needs, values, and perspectives of patients, family members, caregivers, and research participants.
- Respect privacy and property while ensuring clinical and research integrity.

TEAMWORK AND PROFESSIONAL DEMEANOR

- Demonstrate sensitivity to the needs and requests of team members, mentors, and faculty.
- Demonstrate the ability to collaborate with students, faculty, and staff in various settings.
- Exhibit professional demeanor and behaviors that support teamwork and collaboration.
- Demonstrate adaptability and flexibility in various environments.
- Receive constructive criticism with curiosity, intentionality to take action for improvement, and to do so without defensiveness.

SCHOLARSHIP AND COMMITMENT TO EXCELLENCE

- Avoid use of professional position for personal gain.
- Demonstrate behaviors that promote and reflect commitment to academic excellence and scholarly pursuits.

COMMUNICATION

- Address (oral and written) faculty, staff, students, preceptors, practitioners, or patients in a professional, respectful, and considerate manner.

Experiential Education Policies**BACKGROUND CHECKS**

Clinical education sites require background checks and/or drug screenings for employees, as well as for students who come to their facilities. All Northeastern University students will need to have background checks/drug screenings completed if their assigned clinical placement requires it. The college contracts with third-party vendors (such as Universal Background Screening, American DataBank, etc.) to perform these checks and screenings. These companies charge fees to conduct background checks/screenings, depending on the type of background check/screening needed. Students are responsible for any fees charged by companies conducting background checks/screenings.

All background check information is confidential. Results are posted to the company website in a secure, protected environment. A student may view their results online using a password. A student will be contacted by their program director, chair, or assistant dean if there is a question about the results. Neither a student nor the company is required to reveal the actual results of the background check to the clinical site. However, a student may be unable to be placed at that clinical site based on the site's requirements.

If an assigned clinical site requires a student to have a background check/screening, the on-campus clinical coordinator/clinical placement office will post the requirements and provide instructions and a deadline for completing the check. To ensure adequate processing time prior to the start of the clinical experience, it is crucial that the check be completed in advance of the deadline given. Failure to complete the check in a timely manner could jeopardize progression in the academic program.

HEALTH REQUIREMENTS

Students must comply with any universitywide health requirements (<https://catalog.northeastern.edu/undergraduate/information-entering-students/health-requirements-uhcs/>).

As a condition of matriculation at Northeastern, all students are required to submit the completed University Health Report form. Consult the UHCS website (<https://uhcs.northeastern.edu/forms/university-health-report/>) for instructions and deadlines to submit the University Health Report form. UHCS may block the registration of those students who do not file the required form(s).

Clinical Clearance

Based on clinical education site requirements and associated clinical affiliation agreements, some programs in the Bouvé College of Health Sciences will require additional medical documentation and health certification. Additional requirements may include, but are not limited to, exam or statement of good health prior to registration, annual proof of physical examination, and/or proof of additional immunities. This "clinical clearance" may be required by some programs prior to engaging in clinical, internship, or fieldwork. Students who do not meet these prerequisites may be unable to participate in required clinical experiences, which could impact their ability to progress in the program and complete all graduation requirements.

LIABILITY INSURANCE

Students on clinicals, clinical practicum, or clinical internships, under a clinical agreement with Northeastern, are covered by Northeastern's liability insurance program for claims arising out of the student performing assigned duties in the scope of their studies. Students should consult their clinical placement office, program director, and program policies for more information about liability insurance. If students have questions about their placement and the insurance provided, they may contact Risk Services (<https://risk-services.sites.northeastern.edu/>).

REQUIREMENTS FOR CLINICAL, INTERNSHIPS, AND PRACTICUM COURSES

- Some Bouvé programs require courses with clinical, internship, or fieldwork components. Such components are offered at affiliated hospitals, clinics, schools, medical facilities, or other institutions and involve contractual agreements with these institutions or sites.
- Some Bouvé programs have cooperative education requirements. Students secure co-ops through a job search process and are employees of an institution while on co-op. Co-op students are subject to the policies, procedures, and requirements of their employers.
- Northeastern is affiliated with numerous clinical sites across the country and around the world. Depending on the program, students may be required to travel outside of Massachusetts to complete clinical courses. Students are responsible for any costs associated with transportation and/or housing.
- Evaluation for clinical courses will be based on established guidelines and policies that students will receive prior to and/or during the clinical component. Periodic performance evaluations will take place during the course of the academic term. See specific program clinical policies and procedures, handbooks, or course syllabi for details.
- In order to enroll students in university-sponsored accidental injury insurance, elements of students' demographic information (including date of birth, address, and phone number) will be communicated via a university-contracted third-party clinical database to Risk Services and to the company providing the coverage. In addition, programs may use elements of a student's demographic information in the process of site onboarding. Students may refer to the university privacy policy (<https://www.northeastern.edu/privacy-information/>) and contact their program director or clinical placement office for more details.

Student Conduct

- Students assigned to an institution or site for instruction are expected to adhere to the rules and regulations of that institution. Failure to adhere to these rules may result in dismissal from that institution or site.

- Students should be aware that, while participating in any form of clinical practice, they continue to be under the jurisdiction of the university. Any breaches of conduct committed by a student in a clinical setting that would be a violation of the Northeastern University Code of Student Conduct (p. 96) or Bouvé College of Health Sciences Code of Professional Conduct (in the graduate (p.) and undergraduate (<https://catalog.northeastern.edu/undergraduate/health-sciences/academic-policies-procedures/#:~:text=Bouvé College of Health Sciences Code of Professional Conduct>) sections of this catalog), if applicable, shall also be considered a cause for disciplinary action against the student.
- All students are required by federal and state law to respect the confidentiality of the patients' and/or students' records under the Health Insurance Portability and Accountability Act and/or Family Educational Rights and Privacy Act, respectively, to which they may be privy. This includes, but is not limited to, patient/student identity and identifiers, diagnostic tests performed, medical history, special needs, and medications prescribed. For more information, students should contact their on-campus clinical education coordinator and/or clinical education site coordinator.

Health Clearance, Background Check, and Training Requirements

- Evidence of health clearance is required for experiential courses (including clinicals, internships, and practicums) in their field of study.
- Students must meet the health clearance requirements of their academic program and any site-specific requirements prior to entering the clinical setting. This means that students must make arrangements for their physical exams and immunizations months before they are scheduled for a clinical course or rotation. Students who do not present the appropriate health certification will be prohibited from attending a clinical course or rotation until satisfactory evidence is provided. Students who do not meet site-specific requirements may not be able to pass a clinical course and risk their ability to complete the degree program.
- Some programs use clinical clearance software packages (such as Exxat, Complio, or CastleBranch) to ensure compliance with health clearance requirements. In these cases, students are responsible for software account fees. Fees will be paid by the student directly to the software company, from the individual program's clinical placement office. Guidelines are updated periodically, and students must meet the most current guidelines or they will not be allowed into a clinical area.
- School of Nursing students must provide evidence of health documentation utilizing an immunization tracker in order to ensure that documents are updated on a yearly basis. All fees required for the immunization tracking will be paid by the student directly to the tracking service.
- In preparation for clinical education experiences, all students will complete on-site training in universal precautions and safe practices offered by the Office of Academic and Research Safety (<https://oars.northeastern.edu/>) or training vetted and approved by the Office of Environmental Health and Safety and offered by their program. Students must also complete an annual online refresher course in blood-borne pathogens exposure.
- Students may be required to complete background checks/drug screening prior to engaging in clinical, internship, or fieldwork courses as outlined above (p. 778).

Policies for International Students

- International students must consult with the university's Office of Global Services (<https://international.northeastern.edu/ogs/>) before enrolling in clinical, internship, practicum, off-campus directed study, co-op, or capstone courses in order to discuss proper documentation for these curriculum requirements (see also F-1 Curricular Practical Training (<https://international.northeastern.edu/ogs/employment/off-campus-employment/f-1-curricular-practical-training/>)).
- Graduate international nursing students must have a current U.S. nursing license.

Academic, Professional, or Research Misconduct

The healthcare professions represented by the programs in Bouvé College require more of their members than simple mastery of technical knowledge and skills. Equally important is the ability to earn the respect and confidence of those who seek medical care. The nearly universal existence of codes of conduct and standards of professional ethics and behavior in these disciplines is evidence that certain types of conduct are expected in order to promote this respect and confidence. Fundamental to most of these codes is an understanding that healthcare professions require individuals who conduct their activities in a manner that reflects a total concern for the well-being of the patient. Violations of ethical conduct may be grounds for dismissal from the program. Students are expected to learn and practice the conduct that is appropriate to their professions and promotes the physical and mental well-being of the patient.

Bouvé students are expected to adhere to the highest academic and professional standards. The Northeastern University Code of Student Conduct (p. 96) sets forth the university's expectations of behavior that promotes the safety and welfare of the Northeastern community and defines various aspects of academic misconduct, such as cheating and plagiarism. Lack of knowledge of these definitions does not negate the student's responsibility for upholding them. Academic misconduct is regarded as a serious violation of ethical standards and may result in the student's immediate dismissal from the program.

Failure to meet these standards, including misconduct in academic, professional, or research activities, will result in disciplinary action. Such actions may include a lowered or failing grade in the course, probation, suspension, or immediate dismissal from the program. Students found responsible for academic, professional, or research misconduct will have a letter placed in their permanent file stating the pertinent findings of their case.

In addition to maintaining complete honesty in all academic work, students admitted to clinical or professional programs in Bouvé College are expected to familiarize themselves with the code of ethical conduct of the professional discipline they are entering and to agree to uphold these principles.

Similarly, students who participate in research programs are expected to familiarize themselves with the code of ethics in research. Such a code is outlined in *Guidelines for the Conduct of Research*. Ethical codes of conduct for researchers are also presented in the National Academy of Sciences' (<https://www.nap.edu/catalog/12192/on-being-a-scientist-a-guide-to-responsible-conduct-in/>) *On Being a Scientist, A Guide to Responsible Conduct in Research*. Violations of research ethics can include, but are not limited to, falsification or fabrication of data, plagiarism, malicious allegations of

misconduct in science, covering up or failing to report misconduct, obstructing due process in investigations of misconduct, and reprisals against those revealing misconduct.

See also the "Scientific or Research Misconduct" section of the Academic Appeals Policies and Procedures (p. 133) page in this catalog.

Current Student Resources

BCHS STUDENT FORMS
BCHS STUDENT HANDBOOKS

Interdisciplinary Programs

Doctor of Philosophy (PhD)

- Network Science (Boston) (p. 241)
- Personal Health Informatics (Boston) (<https://catalog.northeastern.edu/graduate/computer-information-science/health-informatics/personal-health-informatics-phd/>)

Doctor of Medical Science (DMSc)

- Healthcare Leadership (Boston) (p. 788)

Master of Science (MS)

- Complex Network Analysis (Boston)
- Extended Realities (Boston) (p. 175)
- Health Data Analytics—Online (p. 800)
- Health Informatics (Boston) (p. 447)
- Health Informatics (Vancouver) (p. 450)
- Pharmaceutical Engineering (Boston) (p. 507)
- Statistics (Boston) (p. 187)
- Statistics—Connect (Boston) (p. 189)

Dual Degree

- Law, JD / Public Health, MPH (Boston) (p. 810)
- Pharmacy, PharmD (p. 811)—Direct Entry / Public Health, MPH (Boston) (p. 811)
- Public Health, MPH / Health Informatics, MS (Boston) (p. 811)

Graduate Certificate

- AI Applications (Boston)
- Applied Psychology in Context (Boston)
- Cannabis Science (Boston)
- Early Intervention (Boston) (p. 813)
- Extreme Medicine (Boston)
- Health Informatics Management and Exchange (Boston) (<https://catalog.northeastern.edu/graduate/health-sciences/interdisciplinary/health-informatics-management-exchange-graduate-certificate/>)
- Patient Safety (Boston) (p. 815)

Network Science, PhD (Boston)

The PhD in Network Science program aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is a multidisciplinary program, with members of the Northeastern University Network Science Institute (<https://www.networkscienceinstitute.org/>) representing a range of fields including computer science, information science, physics, complexity, sociology, communication, data visualization, organizational behavior, political science, population health, and epidemiology.

This doctoral program is a joint collaboration across five academic colleges. Students are admitted to the College of Social Sciences and Humanities and may choose to move to the home college of their dissertation advisor after they reach candidacy (once they pass their dissertation proposal/comprehensive exam). Students follow policies of their home college, including dissertation format and submission deadlines for graduation. Faculty supervisors may be from one of the following Northeastern academic colleges:

- College of Science
- College of Social Sciences and Humanities
- Khoury College of Computer Sciences
- Bouvé College of Health Sciences
- College of Arts, Media and Design

Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of elective courses relevant to the student's area of research. Electives should be discussed with the student's faculty advisor. A minimum of 40 semester hours of coursework is required, though the faculty advisor or program committee may recommend additional coursework based on student research skills.

Alternative Course Path

Students have the option to complete core coursework in their first year of study. This curriculum pathway is expected to be taken by students whose admitting advisor is located outside of the Boston campus and elsewhere in the Northeastern network.

Annual Review

A review of satisfactory progress will be ongoing and formally evaluated at the end of each academic year. Students must maintain a cumulative grade-point average of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain a 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for dismissal by the graduate program committee.

As part of the annual review process, the students will be asked to submit a summary of completed and future courses and research. Students will submit to the program committee:

- A list of courses completed in the last academic year and course plan for the following year
- A short synopsis of their research progress and research plans for the next year

Qualifying Examination

The qualifying exam is an hour-long oral examination of the material covered in the core curriculum and consists of questions selected by network science faculty. One month prior to the exam., students receive between 50 to 80 study questions to prepare. Students will be asked to give a short presentation of their research plans, followed by an oral exam where the qualifying exam panel will ask a subset of the review questions.

Students must take the exam by the fall semester of their third year. If students fail the qualifying exam on their first attempt, they may retake the exam in the following semester. Students who do not pass the exam after two attempts will be asked to leave the program.¹

Dissertation Committee

Students must confirm their dissertation advisor by the end of their second year. The dissertation advisor must be a full-time, tenured, tenure-track, research, or teaching faculty member of Northeastern. The advisor should be a network science doctoral program faculty member, unless the student receives approval by the network science program committee.

Students must confirm their dissertation committee prior to their comprehensive exam. The committee must consist of a minimum of four members:

1. A dissertation advisor
2. A core member of the Network Science Institute faculty
3. An additional tenured/tenure-track, research, or teaching faculty member from the Network Science Institute or other Northeastern faculty approved by the advisor and program committee
4. One member recognized as an expert in the specific topic of research, who can be external to Northeastern.

Dissertation Proposal (Comprehensive Examination)

The comprehensive exam should be completed in the student's fourth year of study. The exam consists of two parts: preparation of the dissertation proposal and oral presentation of the proposal. Students must prepare a written comprehensive research proposal describing the dissertation research plan including review of relevant literature, research questions, motivation, methods, any preliminary results, and potential impact. The proposal must be shared with the doctoral committee members two weeks prior to the scheduled presentation.

Students will give a 30-minute oral presentation to their committee members that is open to the public. Following the presentation, the dissertation committee will assess the proposed research plan and provide feedback to the student. If the proposal and/or presentation do not meet the expectations of the committee, the student will be asked to revise their proposal and/or their presentation. The completion of the comprehensive exam is considered successful if the dissertation committee approves as satisfactory both the written proposal and the oral presentation. Students may repeat the comprehensive exam once. If they are unsuccessful in their second attempt, the program will ask the student to leave the program.

PhD Candidacy

A student is considered a doctoral candidate upon completion of the required coursework with a minimum cumulative GPA of 3.000, a passing score on the qualification exam, and satisfactory completion of the comprehensive exam.

Dissertation

A PhD student should aim to complete their dissertation in their fifth year of study. Upon successful completion of the research plan proposed in the dissertation proposal, the candidate has an opportunity to prepare the dissertation for approval by the dissertation committee. The dissertation must contain results of extensive research and make an original contribution to the field. The work should give evidence of the candidate's ability to carry out independent research. It is expected that the dissertation consists of one or more research studies of sufficient quality to merit publication in a reputable journal(s).

Dissertation Defense

Like the dissertation proposal, the dissertation defense consists of two parts: the written dissertation and the defense oral presentation. The PhD candidate should send the written dissertation to their dissertation committee at least one month prior to the dissertation defense.

The oral dissertation defense will be open to the public and will include a Q&A session. Following the presentation, the dissertation committee will communicate their assessment of whether they consider the candidate's dissertation requirement fulfilled. Once the dissertation requirement is fulfilled, the PhD candidate is ready to graduate. Students then apply to graduate and follow the formatting guidelines and deadlines of their home college.

¹Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MS in Network Science degree. Note that no students will be admitted directly into the MS in Network Science to pursue a master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Coursework
Annual reviews
Qualifying exam
Dissertation committee
Dissertation proposal (comprehensive examination)
Dissertation
Dissertation defense

Core Requirements

Code	Title	Hours
Students must complete all 20 semester hours of the core courses listed below, unless the program director approves changes to the student's course plan:		
NETS 5116	Network Science 1	4
NETS 6116	Network Science 2	4
NETS 7332	Machine Learning with Graphs	4
NETS 7334	Social Networks	4
NETS 7335	Dynamical Processes in Complex Networks	4

Electives

Code	Title	Hours
Complete 20 semester hours from the following elective course options.		20

The student's elective course plan should be discussed with, and approved by, their advisor. Students who seek to apply courses not on this list to fulfill program requirements must obtain written approval from their advisor and the program director. Elective options below are organized by domain areas. Students may take courses from one or more domain areas.

Computational Social Science

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5314	Complexity in Social Systems
CNET 5411	Financial and Economic Networks
CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
NETS 7341	Network Economics
NETS 7350	Bayesian and Network Statistics
NETS 7360	Research Design for Social Networks
NETS 7370	Computational Urban Science
NETS 7976	Directed Study

NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHYS 7332	Network Science Data 2
Computer Science	
CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6220	Data Mining Techniques
CS 7180	Special Topics in Artificial Intelligence
CS 7260	Visualization for Network Science
CS 7295	Special Topics in Data Visualization
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHYS 7332	Network Science Data 2
Epidemiology and Public Health	
CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5515	Complex Network Analysis for Biological Systems
CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
NETS 7370	Computational Urban Science
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6202	Intermediate Epidemiology
PHTH 6400	Principles of Population Health 1
PHTH 6410	Principles of Population Health 2
PHTH 6800	Causal Inference in Public Health Research
PHYS 7332	Network Science Data 2
Mathematic and Physics	
CNET 5901	Visualizing Complex Networks
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CS 5800	Algorithms
MATH 7233	Graph Theory
MATH 7243	Machine Learning and Statistical Learning Theory 1
NETS 7976	Directed Study
NETS 8941	Network Science Literature Review Seminar
PHYS 5211	Introduction to Scientific Computing
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
PHYS 7332	Network Science Data 2

Dissertation

Code	Title	Hours
Precandidacy		
Students should register for NETS 8986 after passing the qualifying exam and before completing the comprehensive exam (proposal defense):		
NETS 8986	Research	
Dissertation		

After passing the comprehensive exam (reaching candidacy), students should register for NETS 9990 and NETS 9991, successively:

NETS 9990	Dissertation Term 1
NETS 9991	Dissertation Term 2

Dissertation Continuation

After completing both NETS 9990 and NETS 9991, students should register for NETS 9996 each semester until graduation:

NETS 9996	Dissertation Continuation

Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Typical Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
Elective course		4 NETS 7334	4
Elective course		4 One elective course	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
NETS 7332		4 NETS 7335	4
One elective course		4 One elective course	4
		8	8
Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0

Total Hours: 40

Alternate Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
NETS 7332		4 NETS 7334	4
One elective course		4 NETS 7335	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
Elective		4 Elective	4
Elective		4 Elective	4
		8	8

Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0
Total Hours: 40			

Personal Health Informatics, PhD (Boston)

Northeastern University's Doctor of Philosophy in Personal Health Informatics is a transdisciplinary doctoral program focused on educating top researchers in the theoretical underpinnings, design, evaluation, and dissemination of consumer- and patient-focused health systems. Personal health technologies are those that non-health professionals interact with *directly*, both in and out of a clinical setting and in various life stages of illness and wellness.

Examples include:

- Assistive technologies that aid persons with disabilities
- Consumer wellness promotion technologies
- Patient education and counseling systems
- Interfaces for reviewing personal health records
- Advanced ambulatory monitoring for supporting health
- Automated elder care systems that monitor health and support independent living
- Social networking systems connecting families and their social and medical support networks

Developing personal health interface technologies requires that professionals have skills and experience designing systems for individual patients and consumers with a wide range of backgrounds in different contexts using a variety of media, while ensuring that fielded technologies are effective, reliable, and responsive to the needs of at-risk and patient populations. Critical skills and knowledge include needs assessment, theories of interface design and health behavior, rapid prototyping and implementation, experimental design with human subjects in challenging settings, and statistical data analysis and validation. Moreover, these skills must be deployed while working with, or leading, transdisciplinary teams.

The interdisciplinary nature of the program targets students who are interested in improving health and wellness using novel technologies that directly impact the lives of consumers and patients. This is a program for students who are not only technically strong but also socially conscious, design oriented, and interested in rigorously evaluating the technologies they imagine and build. The program provides a path for technical students to acquire more experience in the deployment and evaluation of health technologies in the field but also a path for students with health backgrounds to develop the technical skills needed to prototype and assess creative ideas they envision for improving care. The expected length of study is five years after the bachelor's degree.

Admission Requirements

Students will be accepted with either of the following:

- A bachelor's or higher degree in a technical discipline (e.g., computer science or information science, computer systems engineering) with either academic or work experience demonstrating a commitment to working in health.
- A bachelor's or higher degree in a health science discipline (e.g., nursing, medicine, physical therapy, pharmacy, public health) with either some academic coursework in technology, such as a course in programming or design, or work experience where the applicant participated in the development, adaptation, or evaluation of consumer- or patient-facing health technology. (Otherwise outstanding applicants without programming skills may be advised to take an introductory programming course prior to entry; otherwise outstanding applicants without any formal experience working in health settings may be advised to spend some time volunteering in a medical or community health setting prior to entry.)

Applicants will be expected to have:

- A minimum 3.000 undergraduate GPA
- A minimum total GRE score of 300 or equivalent

- A minimum GRE academic writing score of 3.5
- For international applicants, a minimum TOEFL score of 105

Minimum Academic Standards and Requirements

RESIDENCY REQUIREMENT

The residency requirement will follow the university's residency requirement for PhD programs (<https://catalog.northeastern.edu/graduate/general-admission-transfer-credit/regulations-phd-programs/>).

TEACHING REQUIREMENT

All personal health informatics PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester.

- Teaches at least three hours of classes
- Prepares at least one assignment, or quiz, or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

DISSERTATION ADVISING

Each student will have one primary advisor from the personal health informatics doctoral program faculty.

DISSERTATION COMMITTEE

The committee will consist of at least three members: the dissertation advisor, one additional personal health informatics doctoral program faculty member, and one member external to Northeastern who is an expert in the specific personal health informatics topic of research. The dissertation committee shall include experts with both health and technology backgrounds. The dissertation advisor must be a full-time member of the Northeastern faculty.

QUALIFYING EXAMINATION

The qualifying examination consists of a three-part exam conducted by a committee of three personal health informatics doctoral program faculty members, each overseeing one part of the exam. The research core of the exam is fulfilled with submission of a high-quality paper to a strong peer-reviewed conference or journal. The health component of the exam is fulfilled when the student passes a written exam developed by a faculty member with a health sciences background, and the technical component of the exam is fulfilled when the student passes an exam developed by a faculty member with a technical background. The content of the written exams and the paper topic are developed in consultation with each faculty member.

DEGREE CANDIDACY

A student is considered a PhD degree candidate upon meeting these conditions:

- Completion of core courses with a minimum GPA of 3.000 overall on the core courses
- Completion of the qualifying examination

COMPREHENSIVE EXAM

A PhD student must submit a written dissertation proposal to the dissertation committee. The proposal should identify the research problem, the research plan, and its potential impact on the field. A presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee.

DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in personal health informatics.

Curriculum Requirements

REQUIRED AND ELECTIVE COURSES

The curriculum is designed to provide all PhD students with a strong foundation in principles critical to the design and evaluation of personal health interfaces. All students take six core courses (24 semester hours) and the user-interface practicum (1 semester hour). The student must maintain a minimum GPA of 3.500 among the six core courses and receive a grade of B or better in each of these courses. All students must also fulfill the programming fundamentals requirement (4 semester hours) and the statistics fundamentals requirement (4 semester hours), where some flexibility in course selection allows tailoring based on background and experience. Two additional research electives (8 semester hours) are selected based on research interests from the personal health informatics electives list. Students are also expected to participate in the personal health informatics seminar series during semesters when it is run.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Annual review
Dissertation proposal
Dissertation committee

Dissertation defense

Core Requirements

A grade of B or higher is required in each course. A cumulative 3.500 grade-point average is required for the core requirement.

Code	Title	Hours
Foundations		
HINF 5200	Theoretical Foundations in Personal Health Informatics	4
Program Design and Development		
CS 5010	Programming Design Paradigm (or another programming course)	4
CS 7340	Theory and Methods in Human Computer Interaction	4
HINF 5300	Personal Health Interface Design and Development	4
Methods and Statistics		
CS 7300	Empirical Research Methods for Human Computer Interaction	4
Complete one of the following:		3-4
CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CS 7200	Statistical Methods for Computer Science	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
Evaluation		
HINF 5301	Evaluating Health Technologies	4
HINF 8982	Readings	1-8

Electives

Code	Title	Hours
Complete 12–17 semester hours in the following subject areas to fulfill the minimum program hours (see faculty advisor for other acceptable elective courses):		12-17
CAEP		
CS		
HINF		
HLTH		
PHTH		

Dissertation

Code	Title	Hours
HINF 9990	Dissertation Term 1	
HINF 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

Plan of Study**Sample Plan of Study**

Code	Title	Hours
Year 1		
<i>Fall Semester</i>		
CS 7340	Theory and Methods in Human Computer Interaction	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
<i>Spring Semester</i>		
CS 5010 or CS 5520	Programming Design Paradigm Mobile Application Development	
CS 7300	Empirical Research Methods for Human Computer Interaction	
Year 2		
<i>Fall Semester</i>		
HINF 5300	Personal Health Interface Design and Development	

788 Healthcare Leadership, DMSc (Boston)

PHTH 5210	Biostatistics in Public Health
or PHTH 6440	Advanced Methods in Biostatistics
or CAEP 7712	Intermediate Statistical Data Analysis Techniques
or CS 7200	Statistical Methods for Computer Science
<i>Spring Semester</i>	
HINF 5301	Evaluating Health Technologies
Personal health informatics electives	
Year 3	
<i>Fall Semester</i>	
HINF 9990	Dissertation Term 1
HINF 8982	Readings
<i>Spring Semester</i>	
HINF 9991	Dissertation Term 2
Personal health informatics electives	
Year 4	
<i>Fall Semester</i>	
HINF 9996	Dissertation Continuation
<i>Spring Semester</i>	
HINF 9996	Dissertation Continuation
Year 5	
<i>Fall Semester</i>	
HINF 9996	Dissertation Continuation
<i>Spring Semester</i>	
HINF 9996	Dissertation Continuation

Healthcare Leadership, DMSc (Boston)

Northeastern University's Doctor of Medical Science is an interdisciplinary degree designed for medical professionals to advance their education and expand their career opportunities through various healthcare concentration areas. Students from diverse healthcare backgrounds share the common goal of developing facility with healthcare systems and becoming leaders within the greater healthcare community.

In addition to taking core courses in healthcare leadership, advocacy, and research methods, students can obtain additional education in one of several areas of specialization. These concentrations are designed to empower graduates from diverse backgrounds with the technical and analytical expertise that is relevant and in high demand in today's healthcare environment. Students will have the opportunity to collaborate with faculty from the Department of Medical Sciences and world-renowned faculty from a variety of interdisciplinary fields within Northeastern and the greater Boston community. This collaboration allows students to access expertise and knowledge across disciplines that will culminate in the creation of an original thesis study.

This degree will take between 16 and 20 months to complete and can be completed fully online. Some concentrations have on-ground curriculum requirements.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Thesis topic approval
Thesis committee
Thesis proposal
Thesis defense

Core Requirements

A grade of B– or higher is required in each course.

Code	Title	Hours
Healthcare Leadership		
MSCI 6001	Principles of Healthcare Advocacy	3

MSCI 6002	Workforce Metrics: Measuring, Comparing, and Privileging the Interprofessional Healthcare Team ⁷	3-4
or HLTH 5800	AI Across the Health Sciences	
MSCI 6003	Healthcare Leadership Seminar	3
PHTH 6204	Society, Behavior, and Health	3
Research		
HLTH 5410	Introduction to Statistics in Health and Behavioral Science	3
MSCI 6900	Research Methods and Design	3
MSCI 6901	Doctoral Writing Seminar	3
MSCI 7990	Thesis	3
Registration in the following course is required if the thesis is not completed by the conclusion of the term of registration for MSCI 7990:		
MSCI 7996	Thesis Continuation - Half-Time ¹	

Concentrations

Completing a concentration is required to complete this program. A minimum of 12 semester hours is required.

- AI Applications (p. 789)
- Business Management (p. 789)
- Exercise Science (p. 790)
- Extreme Medicine (p. 790)
- Health Informatics (p. 790)
- Health Informatics Research (p. 790)
- Health Law (p. 791)
- Interdisciplinary Healthcare Leadership (p. 791)
- Patient Safety (p. 792)
- Public Health (p. 792)

Program Credit/GPA Requirements

Minimum of 36 total semester hours required

Minimum 3.000 GPA required

CONCENTRATION IN AI APPLICATIONS

Code	Title	Hours
Complete 12 semester hours from the following:		12
ARTG 6460	Human-Centered AI	
CS 5047	Exploring AI Trends and Tools	
HLTH 5800	AI Across the Health Sciences ⁸	
PHIL 5110	Responsible AI	

CONCENTRATION IN BUSINESS MANAGEMENT

Code	Title	Hours
Complete a minimum of 12 semester hours from the following:		12
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	
BUSN 6402	Stakeholder Values and Societal Challenges in Business	
ENTR 6250	Lean Design and Development	
FINA 6318	Financial Management	
HINF 5105	The American Healthcare System	
HRMG 6318	Managing the Organization	
INNO 6225	Acquisitions, Alliances, and Growth	
INNO 6318	Innovation Driven Strategy	
MISM 6201	Database Management for Business	
MISM 6202	Foundations of Data Analysis for Business	
MISM 6210	Information Visuals and Dashboards for Business	

MISM 6212	Data Mining and Machine Learning for Business
MKTG 6318	Customer Value and the Enterprise
SCHM 6318	Managing Operations and the Supply Chain
STRT 6318	Strategic Planning for the Future

CONCENTRATION IN EXERCISE SCIENCE

Code	Title	Hours
Concentration Required ²		
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing ³	3
EXSC 5220	Advanced Exercise Physiology	3
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription	3
Selective		
Complete 3 semester hours from the following:		3
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	

CONCENTRATION IN EXTREME MEDICINE

Code	Title	Hours
Complete a minimum of 12 semester hours.		
Concentration Required		
MSCI 5403 and MSCI 5400	Expedition and Wilderness Medicine Experience and Experiential Reflections: Bridging Theory and Experience ^{4, 6}	3
Complete a minimum of 6 semester hours from the following (students may choose additional courses from the list below and/ or an optional experiential elective to meet the minimum 12-semester-hour program requirement):		6-9
MSCI 5001	Human Factors and Situational Awareness	
MSCI 5002	Crisis Resource Management and Case Studies	
MSCI 5003	Humanitarian Aid Practice and Principles	
MSCI 5004	Humanitarian and Disaster Response Ethics	
MSCI 5005	Care During Conflict	
Optional Elective Experiential Courses ⁵		
MSCI 5401 and MSCI 5400	Human Factors and Situational Awareness Experience and Experiential Reflections: Bridging Theory and Experience ^{4, 6}	
MSCI 5402 and MSCI 5400	Expedition and Cold Weather Medicine Experience and Experiential Reflections: Bridging Theory and Experience ^{4, 5, 6}	
MSCI 5405 and MSCI 5400	Humanitarian Medicine Experience and Experiential Reflections: Bridging Theory and Experience ^{4, 5, 6}	

CONCENTRATION IN HEALTH INFORMATICS

Code	Title	Hours
Concentration Required		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 6220	Database Design, Access, Modeling, and Security	3
HINF 6400	Introduction to Health Data Analytics	3
Selective		
Complete 3 semester hours from the following:		3
HINF 5105	The American Healthcare System	
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6205	Creation and Application of Medical Knowledge	

CONCENTRATION IN HEALTH INFORMATICS RESEARCH

Code	Title	Hours
Concentration Required		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 6220	Database Design, Access, Modeling, and Security	3
HINF 6400	Introduction to Health Data Analytics	3
Selective		

Complete 4 semester hours from the following: 4

CS 6350	Empirical Research Methods
HINF 5300	Personal Health Interface Design and Development

CONCENTRATION IN HEALTH LAW

Code	Title	Hours

Concentration Required

LW 6102	Introduction to Legal Studies 2	3

Selectives

LW 6102 is a prerequisite for the LW courses listed below. Complete 9 semester hours from the following: 9

LW 6110	Law of Information and Records
LW 6150	Law and Organizational Management
LW 6180	Health Law Survey
LW 6181	Healthcare Regulation and Compliance
LW 6182	Patient Records, Privacy, and Security
LW 6210	Special Topics in Employee Rights and Employer Obligations

CONCENTRATION IN INTERDISCIPLINARY HEALTHCARE LEADERSHIP

Code	Title	Hours

Complete a minimum of 12 semester hours from the following: 12

Artificial Intelligence

ARTG 6460	Human-Centered AI
CS 5047	Exploring AI Trends and Tools
HLTH 5800	AI Across the Health Sciences ⁹
PHIL 5110	Responsible AI

Business Management

ACCT 6318	Analyzing Accounting Data for Strategic Decision Making
BUSN 6402	Stakeholder Values and Societal Challenges in Business
ENTR 6250	Lean Design and Development
FINA 6318	Financial Management
HINF 5105	The American Healthcare System
INNO 6225	Acquisitions, Alliances, and Growth
INNO 6318	Innovation Driven Strategy
MISM 6201	Database Management for Business
MISM 6202	Foundations of Data Analysis for Business
MISM 6210	Information Visuals and Dashboards for Business
MISM 6212	Data Mining and Machine Learning for Business
MKTG 6318	Customer Value and the Enterprise
SCHM 6318	Managing Operations and the Supply Chain
STRT 6318	Strategic Planning for the Future

Exercise Science

EXSC 5200	Cardiopulmonary Physiology
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing
EXSC 5220	Advanced Exercise Physiology
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription

Extreme Medicine

MSCI 5001	Human Factors and Situational Awareness
MSCI 5002	Crisis Resource Management and Case Studies
MSCI 5003	Humanitarian Aid Practice and Principles
MSCI 5004	Humanitarian and Disaster Response Ethics
MSCI 5005	Care During Conflict

Health Informatics

CS 6350	Empirical Research Methods
HINF 5101	Introduction to Health Informatics and Health Information Systems

HINF 5105	The American Healthcare System
HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 5300	Personal Health Interface Design and Development
HINF 5407	Business Application of Decision Support in Healthcare
HINF 6205	Creation and Application of Medical Knowledge
HINF 6220	Database Design, Access, Modeling, and Security
HINF 6400	Introduction to Health Data Analytics

Health Law

LW 6102	Introduction to Legal Studies 2
LW 6102 is a prerequisite for the following LW courses:	
LW 6110	Law of Information and Records
LW 6150	Law and Organizational Management
LW 6180	Health Law Survey
LW 6181	Healthcare Regulation and Compliance
LW 6182	Patient Records, Privacy, and Security
LW 6210	Special Topics in Employee Rights and Employer Obligations

Patient Safety

HLTH 5600	Introduction to Patient Safety
HLTH 5600 is a concurrent prerequisite for the following HLTH courses:	
HLTH 5610	Patient Safety Science
HLTH 5620	Leadership, Patient Safety, and Clinician Wellness
HLTH 5630	Quality Improvement in Patient Safety

Pharmacy and Health Systems Science

PHMD 5575	Pharmaceutical Industry

Public Health

HLTH 5700	Social Determinants of Health
PHTH 5120	Race, Ethnicity, and Health in the United States
PHTH 5212	Public Health Administration and Policy
PHTH 6200	Principles and History of Urban Health
PHTH 6208	Foundations of Community Health Assessment

CONCENTRATION IN PATIENT SAFETY

Code	Title	Hours
Concentration Required		
HLTH 5600	Introduction to Patient Safety	3
HLTH 5610	Patient Safety Science	3
HLTH 5620	Leadership, Patient Safety, and Clinician Wellness	3
HLTH 5630	Quality Improvement in Patient Safety	3

CONCENTRATION IN PUBLIC HEALTH

Code	Title	Hours
Concentration Required		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Foundations of Community Health Assessment	3

¹ Students who have not completed their thesis but have already registered for the required number of thesis hours, and have no remaining coursework to complete the degree, may register for Thesis Continuation—Half-Time (MSCI 7996) in their last semester (including summer term). There is a 1-semester-hour tuition charge for Thesis Continuation—Half-Time (MSCI 7996). Thesis Continuation may be taken only once.

² Anatomy and Physiology I and II or equivalent and an exercise physiology or medical background are strongly recommended for the Concentration in Exercise Science.

³ Physical Activity and Exercise: Prescription, Measurement, and Testing (EXSC 5210) is offered online with a four-day, on-campus, hands-on lab component in a low-residency format.

⁴ Courses are offered in partnership with World Extreme Medicine. Additional expenses may be associated with the experience courses. Offered on-ground in a four-day experiential format.

⁵ Some of the optional experiential learning experiences are limited to specific groups of medical or allied health professionals.

- One semester hour of Experiential Reflections: Bridging Theory and Experience (MSCI 5400) must be completed for each experience course. Experiential Reflections: Bridging Theory and Experience (MSCI 5400) may be taken concurrently or after the associated courses.
- Students who select AI Across the Health Sciences (HLTH 5800) (4 semester hours) versus Workforce Metrics: Measuring, Comparing, and Privileging the Interprofessional Healthcare Team (MSCI 6002) (3 semester hours) will incur an additional 1-semester-hour cost beyond the total program credits.
- Students who have completed AI Across the Health Sciences (HLTH 5800) as a core requirement must complete the remaining three courses in the Concentration in AI Applications.
- Students who have completed AI Across the Health Sciences (HLTH 5800) as a core requirement may not select this course as part of the Concentration in Interdisciplinary Healthcare Leadership requirements.

Complex Network Analysis, MS (Boston)

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master's degree program in complex network analysis methodologies. The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business
4. Biological systems modeling used across research and industry including network biology, drug discovery, or multi-omics mining

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Biological Networks—College of Science
- Complex Social Systems—College of Social Sciences and Humanities
- Economic and Technological Networks—Khoury College of Computer Sciences
- Population Health Dynamics—Bouvé College of Health Sciences

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CNET 5050	Fundamentals of Complex Networks	4
CNET 5051	Analyzing Complex Network Data	4
CNET 5052	Advanced Tools for Complex Network Analysis	4
CNET 5901	Visualizing Complex Networks	2
CNET 5902	Communicating Network Data	2

Concentrations

Complete one of the following concentrations:

- Complex Biological Networks (p. 167)—College of Science
- Complex Social Systems (p. 168)—College of Social Sciences and Humanities
- Economic and Technological Networks (p. 168)—Khoury College of Computer Sciences
- Population Health Dynamics (p. 169)—Bouvé College of Health Sciences

Experiential Courses

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		4
CNET 6107	Complex Network Analysis Research Rotation	
CNET 6108	Complex Network Analysis Capstone	
CNET 6990	Thesis	

Optional Co-op

Code	Title	Hours
CNET 6000	Professional Development for Co-op	1
CNET 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

Minimum 33 total semester hours required

Additional hours may be required based on student choice of courses or concentration.

One semester hour of additional coursework is required for participation in co-op.

Minimum 3.000 GPA required

CONCENTRATION IN COMPLEX BIOLOGICAL NETWORKS—COLLEGE OF SCIENCE

Code	Title	Hours
A minimum of 16 semester hours is required to complete this concentration.		
Required		
CNET 5515	Complex Network Analysis for Biological Systems	4
Complete 8 semester hours from the following:		8
BINF 6308	Bioinformatics Computational Methods 1	
BINF 6310	Introduction to Bioinformatics	
EEMB 5130	Population Dynamics	
ENVR 5450	Applied Social-Ecological Systems Modeling	
MATH 5131	Introduction to Mathematical Methods and Modeling	
MATH 7340	Statistics for Bioinformatics	
PHYS 5211	Introduction to Scientific Computing	
Complete 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5314	Complexity in Social Systems	
CNET 5411	Financial and Economic Networks	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN COMPLEX SOCIAL SYSTEMS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
A minimum of 13 semester hours is required to complete this concentration.		
Required		
CNET 5314	Complexity in Social Systems	3
Complete a minimum of 6 semester hours from the following:		6
CNET 5311	Physical and Digital Human Traces	
CNET 5360	Research Design for Social Networks	
INSH 5301	Introduction to Computational Statistics	
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	
INSH 6300	Research Methods in the Social Sciences	
INSH 6304	Modeling and Analyzing Social Networks	
INSH 6406	Analyzing Complex Digitized Data	
INSH 6500	Statistical Analysis	

PHYS 5211	Introduction to Scientific Computing	
PPUA 5262	Big Data for Cities	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5411	Financial and Economic Networks	
CNET 5515	Complex Network Analysis for Biological Systems	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN ECONOMIC AND TECHNOLOGICAL NETWORKS—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
A minimum of 14 semester hours is required to complete this concentration.		
Required		
CNET 5411	Financial and Economic Networks	3
Complete a minimum of 7 semester hours from the following:		7
CS 7150	Deep Learning	
CS 7200	Statistical Methods for Computer Science	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
MISM 6212	Data Mining and Machine Learning for Business	
PHYS 5211	Introduction to Scientific Computing	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5314	Complexity in Social Systems	
CNET 5515	Complex Network Analysis for Biological Systems	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN POPULATION HEALTH DYNAMICS—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
A minimum of 14 semester hours is required to complete this concentration.		
Required		
CNET 5126	Spreading on Networks: From Epidemics to Memes	4
Complete a minimum of 6 semester hours from the following:		6
BINF 6308	Bioinformatics Computational Methods 1	
PHTH 5210	Biostatistics in Public Health	
PHTH 6210	Applied Regression Analysis	
PHTH 6224	Social Epidemiology	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6800	Causal Inference in Public Health Research	
PHTH 6801	Causal Inference 1	
PHYS 5211	Introduction to Scientific Computing	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5314	Complexity in Social Systems	
CNET 5411	Financial and Economic Networks	
CNET 5515	Complex Network Analysis for Biological Systems	
CNET 6061	Analyzing Higher-Order Networks	

CNET 6063	Probabilistic Mathematics of Networks
CNET 6099	Special Topics in Complex Networks

Extended Realities, MS (Boston)

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality.

This program is structured to allow students flexibility and specialization to choose a path that matches their interest. Students have an opportunity to focus on a concentration area that matches their professional background and aspirations.

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their home college. The concentrations are associated with the following colleges:

- Khoury College of Computer Sciences
 - Artificial Intelligence
 - Human Computer Interaction
- D'Amore-McKim School of Business
 - Entrepreneurship
 - Marketing
- Bouvé College of Health Sciences
 - Human Movement Science
- College of Social Sciences and Humanities
 - Information Ethics
 - Public History
- College of Engineering
 - Wireless Networking
- College of Arts, Media and Design
 - XR and Design
 - XR and Games
 - XR and Media

The Master of Science in Extended Realities welcomes students from a diverse range of backgrounds because of the applications of XR technology used in many disciplines and industries including medicine, business, entertainment, architecture, and journalism.

Some concentrations may require a technical background and are noted in the requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Extended Reality Core

Code	Title	Hours
Required Courses		
EXRE 5010 and EXRE 5011	Immersive Media: Extended Realities (XR) History, Theory, and Impact and Seminar for EXRE 5010	5
EXRE 5020	Developing Extended Realities (XR)	4
EXRE 5030	Designing Extended Realities (XR)	4
EXRE 7500 or EXRE 7990	Extended Realities (XR) Project Thesis	4
GSND 5122	Business Models in the Game Industry	1

Extended Reality Concentration Options

Complete one of the following options:

- Artificial Intelligence (p. 176)—Khoury College of Computer Sciences
- Entrepreneurship (p. 176)—D'Amore-McKim School of Business
- Human Computer Interaction (p. 176)—Khoury College of Computer Sciences
- Human Movement Science (p. 176)—Bouvé College of Health Sciences
- Information Ethics (p. 177)—College of Social Sciences and Humanities
- Marketing (p. 177)—D'Amore-McKim School of Business

- Public History (p. 177)—College of Social Sciences and Humanities
- Wireless Networking (p. 178)—College of Engineering
- XR and Design (p. 178)—College of Arts, Media and Design
- XR and Games (p. 178)—College of Arts, Media and Design
- XR and Media (p. 178)—College of Arts, Media and Design

Program Credit/GPA Requirements

34 total semester hours required. Some concentrations may require more than 34 semester hours to complete.

Minimum 3.000 GPA required

CONCENTRATION IN ARTIFICIAL INTELLIGENCE—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Requires a background in computer science.		
CS 5097	Mixed Reality	4
CS 5100	Foundations of Artificial Intelligence	4
CS 6120	Natural Language Processing	4
CS 6140	Machine Learning	4
or DS 5220	Supervised Machine Learning and Learning Theory	

CONCENTRATION IN ENTREPRENEURSHIP—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
INNO 6200	Enterprise Growth and Innovation	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
GE 5030	Iterative Product Prototyping for Engineers	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

CONCENTRATION IN HUMAN COMPUTER INTERACTION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Required Courses		
CS 5340	Computer/Human Interaction	4
Electives		
Complete 12 semester hours from the following:		12
ARTG 5710	Design for Dignity	
CS 5097	Mixed Reality	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 6350	Empirical Research Methods	
CS 7390	Special Topics in Human-Centered Computing	
GSND 6340	Biometrics of Design	

CONCENTRATION IN HUMAN MOVEMENT SCIENCE—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
Required Courses		
GSND 6340	Biometrics of Design	4

PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
Electives		
Complete 7–8 semester hours from the following:		7-8
PT 5133	Kinesiology	
PT 5150	Motor Control, Development, and Learning	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 5410	Functional Human Neuroanatomy	
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	
PT 7020	Technologies in Movement and Rehabilitation Science	

CONCENTRATION IN INFORMATION ETHICS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
Electives		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MARKETING—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

CONCENTRATION IN PUBLIC HISTORY—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
HIST 5237	Issues and Methods in Public History	4
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1 (to be taken twice)	
Electives		
Complete 8 semester hours from the following:		8
HIST 5241	Exhibits and Museums	
HIST 7250	Topics in Public History (Public History and Slavery)	
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)	

CONCENTRATION IN WIRELESS NETWORKING—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
EECE 5512	Networked XR Systems	
EECE 7374	Fundamentals of Computer Networks	
Electives		
Complete 8 semester hours from the following:		8
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	

CONCENTRATION IN XR AND DESIGN—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5640	Prototyping for Experience Design	4
EXRE 6500	Extended Realities (XR) Studio	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN XR AND GAMES—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
Electives		
Complete 8 semester hours from the following:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6001	Advanced Topics in Game Science	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6330	Player Experience	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	
GSND 6460	Generative Game Design	

CONCENTRATION IN XR AND MEDIA—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	

JRNL 5311	Design for Storytelling
JRNL 6305	Topics
JRNL 6341	Telling Your Story with Data

Plan of Study

Sample Plan of Study

The following is a sample plan of study for a student in the Concentration in XR and Games.

Year 1			
Fall	Hours	Spring	Hours
EXRE 5010 and EXRE 5011		5 EXRE 5030	4
EXRE 5020		4 GSND 5110 and GSND 5111	5
		9	9
Year 2			
Fall	Hours	Spring	Hours
EXRE 6500		4 EXRE 7500	4
GSND 5122		1 XR and games elective 2	4
XR and games elective 1		4	
		9	8
Total Hours: 35			

Health Data Analytics, MS—Online

The digitization of healthcare systems in clinical settings, in combination with the explosion of personal data collection devices, creates opportunities for using data to revolutionize approaches to health at all levels. The Master of Science in Health Data Analytics prepares students to make an impact on health outcomes, medical knowledge, and healthcare systems by producing data-driven insights.

The fully online and asynchronous Master of Science in Health Data Analytics is intended for students that seek to build analytics skills required to stand out in the healthcare industry. This program is designed for learners from multiple backgrounds and will prepare students with the specific technical skills required to excel in analytical roles in healthcare. Graduates will gain the expertise to extract actionable insights, identify patterns and trends, and inform evidence-based decision making in the dynamic healthcare landscape.

The program combines a robust analytics core presenting fundamental concepts such as data acquisition, data mining, statistics, and data visualization with foundational knowledge for navigating the healthcare data system. Health analytics courses discuss the complex data and information needs throughout the healthcare ecosystem including the needs of payers, providers, and regulatory agencies. Courses on health science as well as courses on the evolving business of healthcare provide students with deep, relevant industry knowledge preparing them for a variety of roles in the space. Students can expect to gain a broad and deep understanding of the various methods, software tools, and topical expertise needed to discover meaningful patterns in health-related data and effectively communicate their implications to a number of diverse stakeholders. In addition to the analytics core and the healthcare core, students will take elective courses allowing them to explore emerging topics of interest in more depth.

Successful graduates of the Master of Science in Health Data Analytics will be effective practitioners and leaders in the rapidly evolving domain of data analytics with a focus on health and healthcare.

Learning Outcomes

- Analyze organizational and stakeholder challenges in healthcare settings and develop data-driven solutions to address those challenges, align with strategic goals, and improve patient outcomes
- Collect health-related data from various sources, ensuring its accuracy and integrity
- Analyze health data using statistical, epidemiological, and data-mining methods, leveraging software tools and programming languages such as R, SAS, or Python to derive actionable insights
- Interpret and visualize analytical results by transforming complex data into clear charts and graphs that convey key insights to nontechnical stakeholders
- Present findings to nontechnical stakeholders by delivering concise, engaging narratives that highlight the implications of the analysis in an easily understandable format

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
DADS 6400	Foundations for Data Analytics	4
DADS 6600	Computation and Visualization for Analytics	4
DADS 7275	Machine Learning and Data Analytics	4
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
HINF 6355	Interoperability Key Standards in Health Informatics	3
HINF 6400	Introduction to Health Data Analytics	3
HSCI 5130	Introduction to Real-World Evidence	2

Electives

Code	Title	Hours
Complete 6 semester hours from the following:		6
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6404	Patient Engagement Informatics and Analytics	
PTH 5210	Biostatistics in Public Health	

Program Credit/GPA Requirements

32 total semester hours required
Minimum 3.000 GPA required

Health Informatics, MS (Boston)

Northeastern University's interdisciplinary Master of Science in Health Informatics was the first MS in the field and is now one of the few that is fully interdisciplinary between health science and computer science.

The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Students may opt to select a concentration to deepen their knowledge in a particular area. Successful students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, information technology professionals, and patients.

Please visit Bouvé College Learning Outcomes (<http://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B– or higher is required in each course.

Core Requirements

Code	Title	Hours
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
Choose one of the following courses in consultation with your advisor:		
HINF 5105 or HINF 5106	The American Healthcare System The Canadian Healthcare System	3

Program Options

Choose one of the following options:

- Health Informatics (Without Concentration) (p. 448)
- Health Informatics with Health Informatics Analytics Concentration (p. 449)
- Health Informatics with Personal Health Informatics Concentration (p. 449)

Program Credit/GPA Requirements

Minimum 33 total semester hours required
Minimum 3.000 GPA required

HEALTH INFORMATICS (WITHOUT CONCENTRATION)

Code	Title	Hours
Required Coursework in Addition to Core Requirements		
<i>Business Management</i>		
Complete two of the following:		6
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
or EMGT 5220	Engineering Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PTH 5226	Management and Leadership in Public Health and Healthcare	
<i>Health Informatics</i>		
Complete two of the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 5301	Evaluating Health Technologies	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PTH 5232	Evaluating Healthcare Quality	
<i>Technical</i>		
Complete two of the following:		6
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	
HINF 6400	Introduction to Health Data Analytics	
HLTH 5800	AI Across the Health Sciences	
PTH 5202	Introduction to Epidemiology	
PTH 5210	Biostatistics in Public Health	
PTH 6210	Applied Regression Analysis	
PTH 6400	Principles of Population Health 1	
PTH 6440	Advanced Methods in Biostatistics	
One course from the following may count toward the technical core requirement:		
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
<i>Capstone</i>		
HINF 7701	Health Informatics Capstone Project	3
<i>Electives</i>		
Complete two of the following:		6
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
HINF 6345	Design for Usability in Healthcare	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
PHIL 5110	Responsible AI	

HEALTH INFORMATICS ANALYTICS CONCENTRATION

Code	Title	Hours
Required Coursework in Addition to Core Requirements		
<i>Business Management</i>		
Complete two of the following:		6
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
or EMGT 5220	Engineering Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Management and Leadership in Public Health and Healthcare	
<i>Health Informatics</i>		
Complete two of the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 5301	Evaluating Health Technologies	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PHTH 5232	Evaluating Healthcare Quality	
<i>Technical</i>		
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4
<i>Capstone</i>		
HINF 7701	Health Informatics Capstone Project	3
Elective		
Complete one of the following:		4
IE 5137	Computational Modeling in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5640	Data Mining for Engineering Applications	
IE 6600	Computation and Visualization for Analytics	
IE 6700	Data Management for Analytics	
IE 7275	Data Mining in Engineering	

PERSONAL HEALTH INFORMATICS CONCENTRATION

Code	Title	Hours
Required Coursework in Addition to Core Requirements		
<i>Health Informatics</i>		
HINF 6205	Creation and Application of Medical Knowledge	3
<i>Technical</i>		
CS 5340	Computer/Human Interaction	4
Complete one of the following. Students must petition to take electives outside the approved list:		4
CS 5010	Programming Design Paradigm	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 6200	Information Retrieval	
Complete one of the following:		3
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	

Theory and Evaluation		
PHTH 5210	Biostatistics in Public Health ¹	3
Complete one of the following:		4
CS 6350	Empirical Research Methods (On campus only)	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
Culminating Experience		
Complete one of the two options below.		6
Thesis Option		
Students must enroll in HINF 7990 for two semesters for a total of 6 semester hours with director approval only and under supervision of Personal Health Informatics faculty:		
HINF 7990	Thesis	
Capstone Option		
HINF 7701	Health Informatics Capstone Project	
Complete any course for a minimum of 3 semester from the Health Informatics (without concentration) curriculum, that has not been used in previous requirements.		

¹ Student may petition director to take a more advanced stats course, such as Applied Regression Analysis (PHTH 6210).

Health Informatics, MS (Vancouver)

Northeastern University's interdisciplinary Master of Science in Health Informatics was the first MS in the field and is now one of the few that is fully interdisciplinary between health science and computer science.

The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, information technology professionals, and patients.

Please visit Bouvé College Learning Outcomes (<http://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Note: For the 2025–2026 academic year, this program will be offered in an online format. If you have questions about eligibility, please reach out to your admissions counselor.

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B– or higher is required in each course.

Code	Title	Hours
Core Requirements		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5106	The Canadian Healthcare System	3
Business Management		
Complete two of the following:		6
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
or EMGT 5220	Engineering Project Management	
HINF 6240	Improving the Patient Experience through Informatics	
HINF 6335	Management Issues in Healthcare Information Technology	
PHTH 5226	Management and Leadership in Public Health and Healthcare	
Health Informatics		
Complete two of the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	

HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 5300	Personal Health Interface Design and Development
HINF 5301	Evaluating Health Technologies
HINF 6205	Creation and Application of Medical Knowledge
HINF 6350	Public Health Surveillance and Informatics
HINF 6404	Patient Engagement Informatics and Analytics
HINF 6405	Quantifying the Value of Informatics
PHTH 5232	Evaluating Healthcare Quality

Technical

Complete two of the following: 6

HINF 6220	Database Design, Access, Modeling, and Security
HINF 6355	Interoperability Key Standards in Health Informatics
HINF 6400	Introduction to Health Data Analytics
HLTH 5800	AI Across the Health Sciences
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6210	Applied Regression Analysis
PHTH 6400	Principles of Population Health 1
PHTH 6440	Advanced Methods in Biostatistics

One course from the following may count toward the technical core requirement:

DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
PHIL 5110	Responsible AI

Capstone

HINF 7701	Health Informatics Capstone Project	3

Electives

Complete two of the following: 6

DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
HINF 6345	Design for Usability in Healthcare
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics

Program Credit/GPA Requirements

Minimum 33 total semester hours required

Minimum 3.000 GPA required

Pharmaceutical Engineering, MS (Boston)

The Master of Science in Pharmaceutical Engineering is offered jointly by Northeastern University's College of Engineering and Bouvé College of Health Sciences. The program prepares students with a fundamental understanding of pharmaceutical sciences and principles of engineering to develop the depth needed for advanced study of pharmaceutical engineering.

This program is generally pursued by students with a Bachelor of Science in Chemical Engineering or closely allied fields in engineering, sciences, or mathematics. The program was designed in collaboration with the Department of Pharmaceutical Sciences to develop the depth needed for advanced study of pharmaceutical engineering. Students wishing to pursue the master's degree with undergraduate educational backgrounds other than engineering are required to demonstrate completion of mathematics coursework through differential equations or the equivalent to be admitted. Prior completion of at least one semester of organic chemistry or the equivalent is also required, and some prior exposure to concepts in biochemistry and molecular biology is helpful. Students are advised to work closely with their advisors and instructors to determine the electives that would meet their career goals.

Part-Time Students

Part-time students may progress according to their plans and time constraints but within the seven-year time limit.

Master of Science students wishing to change their status from part time to full time must notify the chemical engineering department and make a formal petition to the Graduate School of Engineering. Refer to the regulations of the Graduate School of Engineering for further information on academic administrative policies.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CHME 6390	Professional Development and Communication Essentials (Complete this course twice.) ¹	0
CHME 7600	Pharmaceutical Engineering I	4
CHME 7601	Pharmaceutical Engineering II	4
CHME 7602	Pharmaceutical Engineering Laboratory	2
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 7010	Pharmaceutical Sciences Laboratory	4

¹ To be completed each of the first two semesters in the program.

Restricted Elective Courses

Code	Title	Hours
At least 4 semester hours of elective coursework is required from CHME, and at least 2 semester hours of elective coursework is required from PHSC and PMST. These semester hours could come from any elective group, as appropriate.		

Regulatory

Complete 3–4 semester hours from the following: 3-4

BIOE 5250	Regulatory and Quality Aspects of Medical Device Design
BIOT 5340	Introduction to Biotherapeutic Approvals
BIOT 5500	Concepts in Regulatory Science
BIOT 6320	Design and Development of Biopharmaceuticals
RGA 6002	Introduction to Regulatory Compliance and Practice

Quality/Statistics

Complete 4 semester hours from the following: 4

CHME 5185	Design of Experiments and Ethical Research (DOEER)
CHME 6320	Numerical and Statistical Methods for Chemical Engineering
CHME 6410	Chemical Engineering Research Methods
IE 6200	Engineering Probability and Statistics
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
PHSC 6214	Experimental Design and Biostatistics

Depth Electives

Complete 6–7 semester hours from the following: 6-7

BIOE 5115	Dynamical Systems in Biological Engineering
BIOE 5411	Applied Molecular Bioengineering
BIOE 5510	Bioengineering Products/Technology Commercialization
BIOE 5860	Engineering Approaches to Precision Medicine I
BIOT 5330	Drug Safety and Immunogenicity
BIOT 6300	Pharmaceutical Microbiology
BIOT 6340	Sterile Manufacturing Operations
CHME 5160	Drug Delivery: Engineering Analysis
CHME 5179	Complex Fluids and Everyday Materials
CHME 5185	Design of Experiments and Ethical Research (DOEER)
CHME 5510	Fundamentals in Process Safety Engineering
CHME 5515	Process Safety Engineering for Biotechnology and Pharmaceutical Industries
CHME 5631	Biomaterials Principles and Applications

or BIOE 5820	Biomaterials
CHME 5632	Advanced Topics in Biomaterials
CHME 5683	Introduction to Polymer Science
CHME 7330	Chemical Engineering Thermodynamics
CHME 7350	Transport Phenomena
PHSC 5300	Pharmaceutical Biochemistry
PHSC 5310	Cellular Physiology
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies
PHSC 5555	Pharmaceutical Toxicology
PHSC 5560	Nanotoxicity
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Statistics, MS (Boston)

The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The Master of Science in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical machine learning—Khoury College of Computer Sciences
- Statistical theory and modeling—College of Science

Students will follow all policies associated with their home college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800	Causal Inference in Public Health Research	3-4

or PHTH 6801	Causal Inference 1	
PHTH 6830	Generalized Linear Models	4

Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 188)—Bouvé College of Health Sciences
- Statistical Machine Learning (p. 188)—Khoury College of Computer Sciences
- Statistical Theory and Modeling (p. 188)—College of Science

Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses may be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

Program Credit/GPA Requirements

31 total semester hours required (32 for students who declare the Concentration in Statistical Theory and Modeling and also opt to participate in co-op)

Minimum 3.000 GPA required

CONCENTRATION IN BIOSTATISTICS (BOUVÉ COLLEGE OF HEALTH SCIENCES)

Code	Title	Hours
Complete 12 semester hours from the following:		12
PHTH 5350	Using SAS in Public Health Research	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	
Optional Co-op		
HLTH 6964	Co-op Work Experience	0

CONCENTRATION IN STATISTICAL MACHINE LEARNING (KHOURY COLLEGE OF COMPUTER SCIENCES)

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Essentials of Data Science	4
Optional Co-op		
CS 6964	Co-op Work Experience	0

CONCENTRATION IN STATISTICAL THEORY AND MODELING (COLLEGE OF SCIENCE)

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
Optional Co-op		
EESC 6500	Pathways to Professional Success	1
EESC 6964	Co-op Work Experience	0

Statistics, MS—Connect (Boston)

The Master of Science in Statistics—Connect program is designed for students from all backgrounds with a BS/BA degree, provided the student has experience with basic calculus and statistics. The first semester of the degree program provides students with the foundational knowledge needed to study successfully alongside direct-entry graduate students. The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The MS in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouv  College of Health Sciences
- Statistical Machine Learning—Khoury College of Computer Sciences
- Statistical Theory and Modeling—College of Science

Students will follow all policies associated with their college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Connect Courses

Code	Title	Hours
Students are required to complete 8–10 semester hours from the following unless otherwise determined by the program:		8-10
CS 5001	Intensive Foundations of Computer Science	
MATH 5001	Accelerated Linear Algebra	
MATH 5002	Accelerated Multivariable Calculus	
MATH 5003	Accelerated Probability and Statistics	
MATH 5110	Applied Linear Algebra and Matrix Analysis	

Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

Concentrations

Complete one of the following concentrations:

- Biostatistics—Bouv  College of Health Sciences (p. 190)
- Statistical Machine Learning—Khoury College of Computer Sciences (p. 190)
- Statistical Theory and Modeling—College of Science (p. 190)

Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses can be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

Program Credit/GPA Requirements

39-41 total semester hours required (40-42 for students who declare the Concentration in Statistical Theory and Modeling and also opt to participate in co-op)

Minimum 3.000 GPA required

BIostatistics Concentration—Bouvé College of Health Sciences

Code	Title	Hours
Complete 12 semester hours from the following:		12
PTH 5350	Using SAS in Public Health Research	
PTH 6440	Advanced Methods in Biostatistics	
PTH 6802	Causal Inference 2	
PTH 6810	Survival Analysis	
PTH 6820	Design and Analysis of Clinical Trials	
Optional Co-op		
HLTH 6964	Co-op Work Experience	0

Statistical Machine Learning Concentration—Khoury College of Computer Sciences

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Essentials of Data Science	4
Optional Co-op		
CS 6964	Co-op Work Experience	0

Statistical Theory and Modeling Concentration—College of Science

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
Optional Co-op		
EESC 6500	Pathways to Professional Success	1
EESC 6964	Co-op Work Experience	0

Law, JD / Public Health, MPH (Boston)

Northeastern University's School of Law and Bouvé College of Health Sciences offer a JD/MPH dual degree. Given the worldwide trend toward urbanization, the Master of Public Health (MPH) recognizes the growing need for professionals trained to respond to unique public health challenges and opportunities facing urban populations. The MPH program brings together interdisciplinary faculty (from the School of Law, D'Amore-McKim School of Business, College of Social Sciences and Humanities, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences) with expertise in collaborating with diverse urban populations to offer students an opportunity to obtain practice-based knowledge, skills, and experience needed to address public health problems.

Up to 9 credit hours of coursework in the JD program may count toward the MPH, while up to 12 credit hours of coursework in the MPH program may count toward the JD. See the JD/MPH program page (<https://law.northeastern.edu/academics/programs/jd/dual-degrees/public-health-bouve/>) for more information.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Pharmacy, PharmD—Direct Entry / Public Health, MPH (Boston)

The School of Pharmacy and Pharmaceutical Sciences and the Department of Health Sciences offer a combined Doctor of Pharmacy (PharmD) and Master of Public Health (MPH) program.

The combined PharmD/MPH program recognizes and reinforces the importance of public health in pharmacy practice. Central to addressing public health concerns, and in particular those associated with racial and ethnic health disparities, the program is committed to building a strong, diverse, and activist public health workforce. The goal of the program is to graduate professionals who are well educated in the complex issues associated with disparate health status and healthcare access. The combined PharmD/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust understanding of public health through an MPH degree while also completing their PharmD.

Refer to the School of Pharmacy and Pharmaceutical Sciences PharmD—Direct Entry (p. 939) and Department of Health Sciences Master of Public Health (p. 869) pages of this catalog for program requirements and technical standards. Students must adhere to all PharmD and MPH program standards, policies, and requirements as listed in the catalog, unless otherwise specified.

The Northeastern University Master of Public Health Program is accredited by the Council of Education for Public Health (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

Public Health, MPH / Health Informatics, MS (Boston)

Website (<https://bouve.northeastern.edu/health-sciences/programs/ms-hinf-mph/>)

The Master of Public Health and Master of Science in Health Informatics dual degree allows qualified and interested students to prepare to lead healthcare at the nexus between public health and health informatics. Graduates of this program will be well-educated in the complex issues associated with improvements in information technology, as well as changes to the public health and healthcare delivery systems. Recognizing the increasing overlap between health informatics and public health, this program incorporates course work from both the MPH and MSHI curricula for both degrees, reducing tuition costs and saving one year of study compared to obtaining both degrees individually.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH) (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

Up to 15 credits of coursework in the dual-degree program can be counted toward both the MPH and MS degrees.

AI Applications, Graduate Certificate (Boston)

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- College of Social Sciences and Humanities
- D'Amore-McKim School of Business
- Mills College at Northeastern

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

Experiential Courses

Code	Title	Hours
Complete 4 semester hours from the following:		4
CRIM 6600	Justice, Technology, and AI	
EDUT 6150	AI in Education	
HLTH 5800	AI Across the Health Sciences	
IE 5640	Data Mining for Engineering Applications	
JRNL 6460	AI in Media Industries	
MISM 6250	Strategic AI for Business	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Applied Psychology in Context, Graduate Certificate (Boston)

The Graduate Certificate in Applied Psychology in Context provides students with a strong foundation in scientific research and practice in applied psychology with options to focus in areas of interest, including child/adolescent/family, using a core and elective structure. The fully online, asynchronous graduate certificate offers students an opportunity to develop clinical skills for nonlicensed employees in healthcare, school, and other community-based organizations.

Program Requirements

Core Requirements

Code	Title	Hours
CAEP 5879	Trauma and Mental Health	3
CAEP 5880	Clinical Skills in Context	3
CAEP 6203	Understanding Culture and Diversity	3

Elective

Code	Title	Hours
Complete one of the following based on your area of focus:		3
CAEP 6242	Psychopathology: Diagnosis and Treatment Planning	
CAEP 6247	Child and Adolescent Psychopathology	

Program Credits/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Cannabis Science, Graduate Certificate (Boston)

The Graduate Certificate in Cannabis Science offers coursework in cannabis history, business, and law/policy with a primary focus on the chemical/biochemical, pharmacological, scientific, and health/therapeutic aspects of cannabis. This program is designed for students with a strong science background who want to explore the cannabis industry. It provides the knowledge needed to advance careers in healthcare, public policy, or health law, while supporting policy development and public health initiatives. Students have an opportunity to gain a comprehensive understanding of cannabis analysis and applications, the human endocannabinoid system, and the medicinal and clinical implications of cannabis.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Requirements

Code	Title	Hours
Complete three of the following:		12
PHSC 5910	Applied Sciences for the Cannabis Industry	
PHSC 5920	Clinical Application of Cannabis and Cannabinoids	
PHSC 5930	Advanced Translational Research on Medical Cannabis and Cannabinoids	
PHSC 5940	Cannabis Laws, Standards, and Politics	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Early Intervention, Graduate Certificate (Boston)

Northeastern University's Certificate Program in Early Intervention is grounded in interdisciplinary experiential learning and, thus, designed to prepare students for careers working with babies, toddlers, and their family units.

The interdisciplinary nature of the program is enhanced through diversity of both student and instructor experiences. The program spans across several disciplines including school psychology, counseling psychology, and speech-language pathology. Undergraduate students in their final year of schooling and working professionals may also participate, which further enriches the constitution of each year's cohort.

The program is delivered in a fully online format. Classes meet synchronously one day each month, and additional course content is delivered online. This format allows for maximal participation in both classroom learning and experiential application.

This graduate certificate program can be completed by non-degree-seeking students or integrated with master's or doctoral degree programs. Application of coursework from certain degree programs will be approved to apply to requirements of this graduate certificate; students are encouraged to speak with their academic advisors early in their programs to explore these options.

The goals for the early intervention certificate program are to prepare personnel:

- To provide services to infants and toddlers with disabilities and their families from culturally and linguistically diverse backgrounds
- In achieving all early intervention competencies set forth by the Massachusetts DPH and those that are consistent with best practice and research
- In an interdisciplinary manner, drawing from Northeastern's multidisciplinary resources
- To function effectively across teams (individualized family service plan teams, community teams, interagency teams) and to understand the roles of their interdisciplinary and transdisciplinary co-clinicians

Upon graduation, students are eligible for employment in an early intervention service delivery setting.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in all courses.

Code	Title	Hours
Required Core		
Completing the courses below provides eligibility to pursue provisional certification in the state of Massachusetts upon employment in an early intervention setting. Consult with your program director to determine the availability of and recommended/required enrollment sequence for your respective program.		
CAEP 5150	Early Intervention: Family Systems	3
CAEP 5151	Early Intervention: Infant and Toddler Development, Risk, and Disability	3
CAEP 5153	Early Intervention: Assessment and Intervention	3
SLPA 5152	Early Intervention: Planning and Evaluating Services	3
Optional Practicum		
Completing the courses below provides eligibility to pursue provisional certification with advanced standing in the state of Massachusetts upon employment in an early intervention setting. Consult with your program director to determine eligibility for and availability of these course options.		
SLPA 5154	Early Intervention Practicum 1	
SLPA 5155	Early Intervention Practicum 2	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Extreme Medicine, Graduate Certificate (Boston)

Overview

The Graduate Certificate in Extreme Medicine is an interprofessional program designed to prepare healthcare professionals to provide medical services in austere conditions. The core didactic courses are delivered online and provide foundational instruction in human factors, crisis resource management, efficiency of highly skilled teams, and theory and ethics of care in humanitarian crises.

In addition to the online courses, students take one or more on-ground experiential courses offered in an executive format. Experiential courses enable students to complete intensive, hands-on training and apply the principles of extreme medicine. This program is offered in collaboration with World Extreme Medicine (WEM (<https://worldextrememedicine.com/>)).

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/academics/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Core Requirements

A grade of B– or higher is required in each of the following:

Code	Title	Hours
Complete a minimum of 6 semester hours from the following courses. Students may choose additional courses from the list below and/or an optional experiential elective to meet the minimum 12 SH program requirement.		6-9
MSCI 5001	Human Factors and Situational Awareness	
MSCI 5002	Crisis Resource Management and Case Studies	
MSCI 5003	Humanitarian Aid Practice and Principles	
MSCI 5004	Humanitarian and Disaster Response Ethics	
MSCI 5005	Care During Conflict	

Experiential Coursework

Code	Title	Hours
Required Experiential Courses		
MSCI 5403 and MSCI 5400	Expedition and Wilderness Medicine Experience and Experiential Reflections: Bridging Theory and Experience	3
Optional Experiential Electives		
The following experiential courses are optional , but each requires one additional SH of MSCI 5400.		
MSCI 5401 and MSCI 5400	Human Factors and Situational Awareness Experience and Experiential Reflections: Bridging Theory and Experience ¹	
MSCI 5402 and MSCI 5400	Expedition and Cold Weather Medicine Experience and Experiential Reflections: Bridging Theory and Experience ¹	
MSCI 5405 and MSCI 5400	Humanitarian Medicine Experience and Experiential Reflections: Bridging Theory and Experience ¹	

¹ Courses are offered in partnership with World Extreme Medicine (WEM (<https://worldextrememedicine.com/>)). Additional expenses may be associated with the experience courses.
One semester hour of Experiential Reflections: Bridging Theory and Experience (MSCI 5400) must be completed for each experiential course.
Some optional experiential courses may be restricted to licensed or credentialed professionals or to students in the last two years of study in a medical or allied health professional program.
Offered on ground in a 4-day experiential format.

After completion of the 12 required semester hours, students are eligible to register for any of the remaining courses using Bouvé College's Special Student (<https://registrar.northeastern.edu/article/non-matriculated-registration/>) registration process.

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Health Informatics Management and Exchange, Graduate Certificate (Boston)

Overview

The certificate program in health informatics management and exchange offers you the opportunity to obtain the knowledge needed to support the collection, management, retrieval, and exchange of electronic health data. It is designed to prepare you for a position as a specialist in data management, interoperability standards, and health database design.

- Eight-month program
- Five courses, 15 semester hours

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B– or higher is required in all coursework.

Code	Title	Hours
Required Core		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
Management and Exchange		
HINF 6205	Creation and Application of Medical Knowledge	3
HINF 6220	Database Design, Access, Modeling, and Security	3
HINF 6355	Interoperability Key Standards in Health Informatics	3

Program Credit/GPA Requirements

15 total semester hours required

Minimum 3.000 GPA required

Patient Safety, Graduate Certificate (Boston)

Overview

The Graduate Certificate in Patient Safety informs and empowers the next generations of innovative patient safety experts by providing the knowledge and practical skills to promote a culture of safety and design safer systems of care. Future leaders incorporate clinician wellness strategies in care delivery models that are accountable, honest, and transparent. The purpose of this certificate is to support healthcare clinicians and leaders in advancing patient safety and the safety of healthcare providers by expanding their fundamental skills and knowledge in patient safety science principles, workforce wellness, and quality improvement strategies.

This is a four-course, interdisciplinary graduate certificate, tailored to accommodate a busy healthcare professional's schedule. Courses are delivered in an online format, structured to enhance the curriculum with peer-to-peer discussions and experience developing tools, protocols, and process improvement strategies.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

A grade of B or higher is required in each course.

Code	Title	Hours
HLTH 5600	Introduction to Patient Safety	3
HLTH 5610	Patient Safety Science	3
HLTH 5620	Leadership, Patient Safety, and Clinician Wellness	3
HLTH 5630	Quality Improvement in Patient Safety	3

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.00 GPA required

School of Clinical and Rehabilitation Sciences

Website (<https://bouve.northeastern.edu/academics/school-of-clinical-and-rehabilitation-sciences/communication-sciences-and-disorders/>)

Emily Zimmerman, PhD, CCC-SLP

Chair and Professor

Department of Communication Sciences and Disorders

617.373.5140

617.373.2239 (fax)

Website (<https://bouve.northeastern.edu/academics/school-of-clinical-and-rehabilitation-sciences/medical-sciences/>)

Carey Barry, MHS, PA-C, MT (ASCP), DFAAPA

Chair and Associate Clinical Professor

Department of Medical Sciences

617.373.3195

617.373.3338 (fax)

nu.dms@northeastern.edu

Website (<https://bouve.northeastern.edu/academics/school-of-clinical-and-rehabilitation-sciences/physical-therapy-movement-and-rehabilitation-sciences/>)

Darla M. Castelli, PhD

Chair and Professor

Department of Physical Therapy, Movement, and Rehabilitation Sciences

617.373.3508

617.373.7930 (fax)

physicaltherapy@northeastern.edu

Info_HMRS@northeastern.edu

PB_DPT_Inquiries@northeastern.edu

The School of Clinical and Rehabilitation Sciences within the Bouvé College of Health Sciences at Northeastern University brings together the clinical fields of physical therapy (<https://bouve.northeastern.edu/academics/school-of-clinical-and-rehabilitation-sciences/physical-therapy-movement-and-rehabilitation-sciences/>), speech-language pathology and audiology (<https://bouve.northeastern.edu/academics/school-of-clinical-and-rehabilitation-sciences/communication-sciences-and-disorders/>), medical sciences, and physician assistant studies (<https://bouve.northeastern.edu/academics/school-of-clinical-and-rehabilitation-sciences/medical-sciences/>). Students and fellows in the school are prepared for clinical and research excellence, training with interdisciplinary experts in habilitation and rehabilitation sciences, epidemiology, neuroscience, engineering, physiology, exercise science, clinical medicine, design, diagnostic and therapeutic imaging, and communication. Working at the intersection of rehabilitation, clinical practice, data, and engineering, students and fellows engage in transformative research and experiential learning that is designed to prepare them to improve the quality of life and self-care for patients and communities, while promoting and developing innovative approaches to the future of healthcare.

Communication Sciences and Disorders

Our mission is to advance the science of human communication and its disorders, understand the science of human communication untethered from traditional limitations of the field, and make a direct impact on the world through targeted learning experiences and research opportunities, while creating an inclusive community. Our faculty are researchers, practicing clinicians, and scientists who bring real-world experience into the classroom to facilitate bench-to-bedside application. They develop, use, and address technology that improves communication and health beyond traditional boundaries.

The Department of Communication Sciences and Disorders offers a five-year PlusOne advanced degree pathway (BS-MS in Speech-Language Pathology) and a two-year, five-semester Master of Science in Speech-Language Pathology degree. A Master of Science in Speech-Language Pathology—Connect degree program is also offered as a six-semester degree, which includes a summer semester of bridge coursework for students who need to complete prerequisite requirements. Our goal is to educate students to the highest levels of professionalism, consistent with the American Speech-Language-Hearing Association and the Council on Academic Accreditation, Northeastern University accreditation standards, and Massachusetts licensure requirements. We provide an interprofessional and practice-oriented education in our urban university environment,

which affords students clinical experiences with clients, patients, and families from a diverse population base. Students are prepared with academic coursework informed by the most current scientific knowledge and evidence-based clinical practice.

Master of Science (MS)

- Speech-Language Pathology (Boston) (p. 818)
- Speech-Language Pathology (Charlotte) (p. 820)
- Speech-Language Pathology, MS—Connect (Boston) (p. 822)
- Speech-Language Pathology, MS—Connect (Charlotte) (p. 823)

Medical Sciences

The mission of the Department of Medical Sciences is to educate and inspire diverse and interdisciplinary professionals to be leaders and innovators in medical science. We offer an interdisciplinary doctoral degree in healthcare leadership, a Master of Science in Physician Assistant Studies, and a Graduate Certificate in Extreme Medicine.

Our flagship program in PA studies was established in 1971 and has a long-standing history of, and expertise in, the education and training of PAs. The PA program is located in close proximity to Boston's major academic medical centers and was the first generalist PA training program in the nation to offer a master's degree in 1985. This rigorous, highly integrated curriculum offers our students the opportunity to obtain broad generalist training that is designed to prepare them for successful employment in all fields of clinical practice.

The Doctor of Medical Science in Healthcare Leadership is an interdisciplinary online degree for healthcare professionals from diverse backgrounds to advance their education and expand their career opportunities in the areas of healthcare leadership, entrepreneurship, medical education, applied AI, and community engagement and advocacy.

The Graduate Certificate in Extreme Medicine is an online interprofessional program offered in collaboration with World Extreme Medicine. The program is designed to prepare healthcare professionals to provide medical services in austere conditions. The core didactic courses provide foundational instruction in human factors, crisis resource management, efficiency of highly skilled teams, and theory and ethics of care in humanitarian crises.

Our faculty members are practicing clinicians, researchers, and healthcare leaders who bring real-world experience to the classroom. Northeastern University's graduates are in high demand and are employed in positions across the United States and internationally. In addition to clinical practice, our graduates are employed in research, administration, education, and leadership.

Doctor of Medical Science (DMSc)

- Healthcare Leadership (p. 788) (Boston)

Master of Science (MS)

- Physician Assistant (p. 830) (Boston)

Graduate Certificate

- Extreme Medicine (p. 814) (Boston)

Physical Therapy, Movement, and Rehabilitation Sciences Shaping the Future of Movement Science and Rehabilitation

The Department of Physical Therapy, Movement, and Rehabilitation Sciences at Northeastern University is dedicated to making a profound impact on the health and well-being of the global community. We accomplish this by developing leaders in our fields through interprofessional experiential education, groundbreaking research, and a commitment to excellence in clinical practice. Our mission aligns with the broader goals of Bouvé College of Health Sciences and Northeastern University, enhancing student learning through hands-on experiential education, fostering interdisciplinary collaborations, promoting interprofessional education, and creating meaningful research opportunities.

Within our department, students find themselves immersed in a vibrant community of scholarship and innovation. Our faculty members are recognized leaders in education, research, and clinical practice who mentor students as they explore the frontiers of human movement and rehabilitation science. The research landscape within our department is rich and diverse, spanning multiple specialized facilities including the labs NeuroRehabilitation Engineering, Robotics-Rehabilitation-Locomotion, Programmable and Reconfigurable Soft Engineered Systems, ReGame-XR, BALANCE, Cognitive and Brain Health, i-HBN, Exercise Psychology, TRIBE, and LAB:SYNC. In these dynamic environments, students work alongside faculty to conduct cutting-edge research that advances our understanding of human movement and rehabilitation across the life span.

Our flagship program, the **Doctor of Physical Therapy**, stands as one of the oldest within Bouvé College, with a proud tradition dating back to our first graduates in 1915. This comprehensive 37-month program offers rigorous graduate-level coursework complemented by a distinctive and valuable cooperative education experience—a six-month paid work opportunity in a physical therapy setting that allows students to apply theoretical knowledge in real-world contexts. Students seeking specialized expertise can pursue concentrations in sports performance or pediatric physical therapy, tailoring their education to align with their professional aspirations.

For those drawn to research and academic leadership, our **PhD in Human Movement and Rehabilitation Sciences** prepares graduates to conduct independent original research that restores and maximizes human functional capacity and well-being throughout the life span. This interdisciplinary

program emphasizes core competencies in motor control and motor learning, sophisticated movement measurement and analysis, knowledge translation theory, and the application of both traditional and emerging technologies. Our doctoral students emerge as thought leaders prepared to advance the theoretical foundations and practical applications of movement science.

The **Master of Science in Human Movement and Rehabilitation Sciences** offers an intensive 12-month program focused on innovative rehabilitation solutions through enhanced research and education. Students explore diverse topics including biomechanics, musculoskeletal disorders, control of movement, motor learning, health and well-being through movement design, human-cybernetic system interactions, and neurorehabilitation of movement and function. This program is available as a PlusOne option with several other Northeastern departments, creating particularly strong synergies with programs in the College of Engineering.

Through a prestigious partnership with Massachusetts General Hospital Sports Physical Therapy, we offer a 13-month full-time clinical residency program for licensed physical therapists pursuing careers in sports physical therapy. This specialized program advances the knowledge and clinical competency of sports physical therapists while fostering a culture of continued learning and scientific inquiry. Residents demonstrate an unwavering commitment to patients, students, and athletes at all levels, developing advanced skills that distinguish them as specialists in this dynamic field.

Doctor of Philosophy (PhD)

- Human Movement and Rehabilitation Sciences (Boston) (p. 831)

Doctor of Physical Therapy (DPT)

- Doctor of Physical Therapy—Postbaccalaureate Entry (Boston) (p. 834)

Master of Science (MS)

- Extended Realities (Boston) (p. 175)
- Human Movement and Rehabilitation Sciences (Boston) (p. 845)

Speech-Language Pathology, MS (Boston)

Adhering to the highest professional standards, the speech-language pathology graduate program seeks to prepare future speech-language pathologists for the rigors of clinical practice across the life span. Graduates of the program will influence society in profound ways—for example, enabling children with autism to communicate effectively, relieving adolescents' fears of speaking dysfluently in the classroom, and helping stroke survivors resume activities in which they had previously participated. The comprehensive program of study emphasizes teamwork and interdisciplinary approaches to complex service delivery issues. Through academic and clinical experiences, SLP graduate students acquire the knowledge and skills needed for a lifetime of professional achievement and social contribution.

Milestone Requirement Options

Students choose either of the following options:

COMPREHENSIVE EXAMINATION

Students must complete a comprehensive examination during the final year in the program in order to graduate. Students must have completed Speech-Language Pathology Advanced Clinical Practicum 4 (SLPA 6418) or be currently enrolled in Speech-Language Pathology Advanced Clinical Practicum 4 (SLPA 6418) in order to be eligible to take the comprehensive examination. Students may submit a written request to the program director in order to take the comprehensive examination prior to enrolling in Speech-Language Pathology Advanced Clinical Practicum 4 (SLPA 6418).

MASTER'S THESIS

Students who elect to complete a master's thesis will have the comprehensive examination requirement waived.

Prerequisite or Equivalent Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of their background, must have completed coursework with content equivalent in the following courses with a minimum grade of C.

Code	Title	Hours
SLPA 1102	Language Development	
SLPA 1103	Anatomy and Physiology of Speech and Hearing Mechanism	
SLPA 1200	Phonetics	
SLPA 1203	Introduction to Audiology	
SLPA 1205	Speech and Hearing Science	

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Comprehensive examination or master's thesis

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Disorders		
SLPA 5201	Diagnostic Testing in Speech-Language Pathology	2
SLPA 6303	Stuttering	3
SLPA 6304	Augmentative and Alternative Communication	3
SLPA 6305	Articulation and Phonology	3
SLPA 6307	Voice Disorders	3
SLPA 6308	Dysphagia	3
SLPA 6313	Counseling in Speech-Language Pathology	2
SLPA 6321	Motor Speech Disorders	3
SLPA 6340	Language Disorders in Children 1	3
SLPA 6341	Language Disorders in Children 2	3
SLPA 6342	Speech-Language Disorders In Adults 1	3
SLPA 6343	Speech-Language Disorders in Adults 2	3
Complete one of the following, as determined by the faculty advisor. ¹		3
SLPA 6219	Aural Rehabilitation	
or electives from the list below (p. 819)		
Science		
SLPA 5109	Neurology of Communication	3
SLPA 6300	Speech Science	2
Research		
SLPA 6211	Research and Evidence-Based Practice	3
Diversity, Equity, and Inclusion		
SLPA 6360	Diversity, Equity, and Inclusion in Speech-Language Pathology	3
Practicum		
SLPA 6415	Speech-Language Pathology Advanced Clinical Practicum 1	3
SLPA 6416	Speech-Language Pathology Advanced Clinical Practicum 2	2
SLPA 6417	Speech-Language Pathology Advanced Clinical Practicum 3	2
SLPA 6418	Speech-Language Pathology Advanced Clinical Practicum 4	2

¹ Students who are assessed not to require Aural Rehabilitation (SLPA 6219) will choose an *additional* 3 semester hours of electives (below), for a total of 6 semester hours of electives for degree completion.

Electives

Code	Title	Hours
Complete 3 semester hours of coursework from the options below:		3
Students who have previously completed SLPA 5107 (or equivalent, as determined by the faculty advisor) should complete Option B below.		
All other students must complete Option A below.		
Option A		
SLPA 5107	Clinical Procedures	
Option B		
SLPA 6320	Autism	
SLPA 6325	Accent Modification for Speech-Language Pathology	
SLPA 6332	Seminar in Communication Disorders	
SLPA 6339	Language Literacy in Practice	

SLPA 6350

Speech-Language Pathology in Medical Settings

Other courses may be chosen with preapproval of the student's faculty advisor.

Optional Thesis

Code	Title	Hours
Complete 3 semester hours across two semesters with prior approval.		3
SLPA 6990	Thesis	

Program Credit/GPA Requirements

60 total semester hours required (63 with optional thesis)

Minimum 3.000 GPA required

Speech-Language Pathology, MS (Charlotte)

Adhering to the highest professional standards, the speech-language pathology graduate program seeks to prepare future speech-language pathologists for the rigors of clinical practice across the lifespan. Graduates of the program will influence society in profound ways—for example, enabling children with autism to communicate effectively, relieving adolescents' fears of speaking dysfluently in the classroom, and helping stroke survivors resume activities in which they had previously participated. The comprehensive program of study emphasizes teamwork and interdisciplinary approaches to complex service delivery issues. Through academic and clinical experiences, SLP graduate students acquire the knowledge and skills needed for a lifetime of professional achievement and social contribution.

Milestone Requirement Options

Students choose either of the following options:

COMPREHENSIVE EXAMINATION

Students must complete a comprehensive examination during the final year in the program in order to graduate. Students must have completed Speech-Language Pathology Advanced Clinical Practicum 4 (SLPA 6418) or be currently enrolled in Speech-Language Pathology Advanced Clinical Practicum 4 (SLPA 6418) in order to be eligible to take the comprehensive examination. Students may submit a written request to the program director in order to take the comprehensive examination prior to enrolling in Speech-Language Pathology Advanced Clinical Practicum 4 (SLPA 6418).

MASTER'S THESIS

Students who elect to complete a master's thesis will have the comprehensive examination waived.

Prerequisite or Equivalent Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of their background, must have completed coursework with content equivalent in the following courses with a minimum grade of C.

Code	Title	Hours
SLPA 1102	Language Development	
SLPA 1103	Anatomy and Physiology of Speech and Hearing Mechanism	
SLPA 1200	Phonetics	
SLPA 1203	Introduction to Audiology	
SLPA 1205	Speech and Hearing Science	

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Comprehensive examination or master's thesis

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Disorders		
SLPA 5201	Diagnostic Testing in Speech-Language Pathology	2
SLPA 6303	Stuttering	3

SLPA 6304	Augmentative and Alternative Communication	3
SLPA 6305	Articulation and Phonology	3
SLPA 6307	Voice Disorders	3
SLPA 6308	Dysphagia	3
SLPA 6313	Counseling in Speech-Language Pathology	2
SLPA 6321	Motor Speech Disorders	3
SLPA 6340	Language Disorders in Children 1	3
SLPA 6341	Language Disorders in Children 2	3
SLPA 6342	Speech-Language Disorders In Adults 1	3
SLPA 6343	Speech-Language Disorders in Adults 2	3
Complete one of the following, as determined by the faculty advisor: ¹		3
SLPA 6219	Aural Rehabilitation	
or Electives from the list below. (p. 821)		
Science		
SLPA 5109	Neurology of Communication	3
SLPA 6300	Speech Science	2
Research		
SLPA 6211	Research and Evidence-Based Practice	3
Diversity, Equity, and Inclusion		
SLPA 6360	Diversity, Equity, and Inclusion in Speech-Language Pathology	3
Practicum		
SLPA 6415	Speech-Language Pathology Advanced Clinical Practicum 1	3
SLPA 6416	Speech-Language Pathology Advanced Clinical Practicum 2	2
SLPA 6417	Speech-Language Pathology Advanced Clinical Practicum 3	2
SLPA 6418	Speech-Language Pathology Advanced Clinical Practicum 4	2

¹ Students who are assessed not to require Aural Rehabilitation (SLPA 6219) will choose an *additional* 3 semester hours of electives (below), for a total of 6 semester hours of electives for degree completion.

Electives

Code	Title	Hours
Complete 3 semester hours of coursework from the options below:		3
Students who have previously completed SLPA 5107 (or equivalent, as determined by the faculty advisor) should complete Option B below.		
All other students must complete Option A below.		
Option A		
SLPA 5107	Clinical Procedures	
Option B		
SLPA 6320	Autism	
SLPA 6325	Accent Modification for Speech-Language Pathology	
SLPA 6332	Seminar in Communication Disorders	
SLPA 6339	Language Literacy in Practice	
SLPA 6350	Speech-Language Pathology in Medical Settings	
Other courses may be chosen with pre-approval of the student's faculty advisor.		

Optional Thesis

Code	Title	Hours
Complete 3 semester hours across two semesters with prior approval.		3
SLPA 6990	Thesis	

Program Credit/GPA Requirements

60 total semester hours required (63 with optional thesis)
Minimum 3.000 GPA required

Speech-Language Pathology, MS—Connect (Boston)

Adhering to the highest professional standards, the speech-language pathology graduate program seeks to prepare future speech-language pathologists for the rigors of clinical practice across the life span. Graduates of the program will influence society in profound ways—for example, enabling children with autism to communicate effectively, relieving adolescents' fears of speaking dysfluently in the classroom, and helping stroke survivors resume activities in which they had previously participated. The comprehensive program of study emphasizes teamwork and interdisciplinary approaches to complex service delivery issues. Through academic and clinical experiences, speech-language pathology graduate students acquire the knowledge and skills needed for a lifetime of professional achievement and social contribution.

This program can be completed in six semesters of full-time study and is designed for students entering without a bachelor's degree in communication sciences and disorders or a bachelor's degree in speech-language pathology. Students who already possess a bachelor's degree in communication sciences and disorders or speech-language pathology or who have completed three or more of the bridge courses should consider the Speech-Language Pathology, MS (p. 818) program.

Milestone Requirement Options

Students choose either of the following options:

COMPREHENSIVE EXAMINATION

Students must complete a comprehensive examination during the final year in the program in order to graduate. Students must have completed Speech-Language Pathology Advanced Clinical Practicum 4 (SLPA 6418) or be currently enrolled in SLPA 6418 in order to be eligible to take the comprehensive examination. Students may submit a written request to the program director in order to take the comprehensive examination prior to enrolling in SLPA 6418.

MASTER'S THESIS

Students who elect to complete a master's thesis will have the comprehensive examination requirement waived.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Comprehensive examination or master's thesis

Connect Bridge Coursework

Students are required to complete three or more of the following bridge courses, to be determined by faculty mentor.

A grade of B or higher is required in each course.

Code	Title	Hours
SLPA 5300	Intensive Phonetics	3
SLPA 5302	Intensive Language Development	3
SLPA 5303	Intensive Anatomy and Physiology of Speech and Hearing Mechanism	3
SLPA 5305	Intensive Speech and Hearing Science	3
SLPA 5403	Applied Foundations of Audiology	3

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Disorders		
SLPA 5201	Diagnostic Testing in Speech-Language Pathology	2
SLPA 6303	Stuttering	3
SLPA 6304	Augmentative and Alternative Communication	3
SLPA 6305	Articulation and Phonology	3
SLPA 6307	Voice Disorders	3
SLPA 6308	Dysphagia	3
SLPA 6313	Counseling in Speech-Language Pathology	2
SLPA 6321	Motor Speech Disorders	3
SLPA 6340	Language Disorders in Children 1	3

SLPA 6341	Language Disorders in Children 2	3
SLPA 6342	Speech-Language Disorders In Adults 1	3
SLPA 6343	Speech-Language Disorders in Adults 2	3
Complete one of the following, as determined by the faculty advisor: ¹		3
SLPA 6219	Aural Rehabilitation	
Electives from the list below (p. 823)		
Science		
SLPA 5109	Neurology of Communication	3
SLPA 6300	Speech Science	2
Research		
SLPA 6211	Research and Evidence-Based Practice	3
Diversity, Equity, and Inclusion		
SLPA 6360	Diversity, Equity, and Inclusion in Speech-Language Pathology	3
Practicum		
SLPA 6415	Speech-Language Pathology Advanced Clinical Practicum 1 ²	3
SLPA 6416	Speech-Language Pathology Advanced Clinical Practicum 2	2
SLPA 6417	Speech-Language Pathology Advanced Clinical Practicum 3	2
SLPA 6418	Speech-Language Pathology Advanced Clinical Practicum 4	2

¹ Students who are assessed not to require Aural Rehabilitation (SLPA 6219) will choose an *additional* 3 semester hours of electives (below), for a total of 6 semester hours of electives for degree completion.

Electives

Code	Title	Hours
Complete 3 semester hours of coursework from the options below.		3
Students who have previously completed SLPA 5107 (or equivalent, as determined by the faculty advisor) should complete Option B below.		
All other students must complete Option A below.		
Option A		
SLPA 5107	Clinical Procedures	
Option B		
Other courses may be chosen with preapproval of the student's faculty advisor.		
SLPA 6320	Autism	
SLPA 6325	Accent Modification for Speech-Language Pathology	
SLPA 6332	Seminar in Communication Disorders	
SLPA 6339	Language Literacy in Practice	
SLPA 6350	Speech-Language Pathology in Medical Settings	

Optional Thesis

Code	Title	Hours
Complete 3 semester hours across two semesters with prior approval.		3
SLPA 6990	Thesis	

Program Credit/GPA Requirements

69-75 total semester hours required (78 with optional thesis)

Minimum 3.000 GPA required

Speech-Language Pathology, MS—Connect (Charlotte)

Adhering to the highest professional standards, the speech-language pathology graduate program seeks to prepare future speech-language pathologists for the rigors of clinical practice across the life span. Graduates of the program will influence society in profound ways—for example, enabling children with autism to communicate effectively, relieving adolescents' fears of speaking dysfluently in the classroom, and helping stroke survivors resume activities in which they had previously participated. The comprehensive program of study emphasizes teamwork and interdisciplinary approaches to complex service delivery issues. Through academic and clinical experiences, speech-language pathology graduate students acquire the knowledge and skills needed for a lifetime of professional achievement and social contribution.

This program can be completed in six semesters of full-time study and is designed for students entering without a bachelor's degree in communication sciences and disorders or a bachelor's degree in speech-language pathology. Students who already possess a bachelor's degree in communication sciences and disorders or speech-language pathology or who have completed three or more of the bridge courses should consider the MS Speech-Language Pathology (p. 818) program.

Milestone Requirement Options

Students choose either of the following options:

COMPREHENSIVE EXAMINATION

Students must complete a comprehensive examination during the final year in the program in order to graduate. Students must have completed Speech-Language Pathology Advanced Clinical Practicum 4 (SLPA 6418) or be currently enrolled in SLPA 6418 in order to be eligible to take the comprehensive examination. Students may submit a written request to the program director in order to take the comprehensive examination prior to enrolling in SLPA 6418.

MASTER'S THESIS

Students who elect to complete a master's thesis will have the comprehensive examination requirement waived.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Comprehensive examination or master's thesis

Connect Bridge Coursework

Students are required to complete three or more of the following bridge courses, to be determined by faculty mentor.

A grade of B or higher is required in each course.

Code	Title	Hours
SLPA 5300	Intensive Phonetics	3
SLPA 5302	Intensive Language Development	3
SLPA 5303	Intensive Anatomy and Physiology of Speech and Hearing Mechanism	3
SLPA 5305	Intensive Speech and Hearing Science	3
SLPA 5403	Applied Foundations of Audiology	3

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Disorders		
SLPA 5201	Diagnostic Testing in Speech-Language Pathology	2
SLPA 6303	Stuttering	3
SLPA 6304	Augmentative and Alternative Communication	3
SLPA 6305	Articulation and Phonology	3
SLPA 6307	Voice Disorders	3
SLPA 6308	Dysphagia	3
SLPA 6313	Counseling in Speech-Language Pathology	2
SLPA 6321	Motor Speech Disorders	3
SLPA 6340	Language Disorders in Children 1	3
SLPA 6341	Language Disorders in Children 2	3
SLPA 6342	Speech-Language Disorders In Adults 1	3
SLPA 6343	Speech-Language Disorders in Adults 2	3
Complete one of the following, as determined by the faculty advisor: ¹		3
SLPA 6219	Aural Rehabilitation	
Electives from the list below		
Science		
SLPA 5109	Neurology of Communication	3

SLPA 6300	Speech Science	2
Research		
SLPA 6211	Research and Evidence-Based Practice	3
Diversity, Equity, and Inclusion		
SLPA 6360	Diversity, Equity, and Inclusion in Speech-Language Pathology	3
Practicum		
SLPA 6415	Speech-Language Pathology Advanced Clinical Practicum 1 ²	3
SLPA 6416	Speech-Language Pathology Advanced Clinical Practicum 2	2
SLPA 6417	Speech-Language Pathology Advanced Clinical Practicum 3	2
SLPA 6418	Speech-Language Pathology Advanced Clinical Practicum 4	2

¹ Students who are assessed not to require Aural Rehabilitation (SLPA 6219) will choose an *additional* 3 semester hours of electives (below), for a total of 6 semester hours of electives for degree completion.

Electives

Code	Title	Hours
Complete 3 semester hours of coursework from the options below.		3
Students who have previously completed SLPA 5107 (or equivalent, as determined by the faculty advisor) should complete Option B below.		
All other students must complete Option A below.		
Option A		
SLPA 5107	Clinical Procedures	
Option B		
Other courses may be chosen with preapproval of the student's faculty advisor.		
SLPA 6320	Autism	
SLPA 6325	Accent Modification for Speech-Language Pathology	
SLPA 6332	Seminar in Communication Disorders	
SLPA 6339	Language Literacy in Practice	
SLPA 6350	Speech-Language Pathology in Medical Settings	

Optional Thesis

Code	Title	Hours
Complete 3 semester hours across two semesters with prior approval.		3
SLPA 6990	Thesis	

Program Credit/GPA Requirements

69-75 total semester hours required (78 with optional thesis)

Minimum 3.000 GPA required

Healthcare Leadership, DMSc (Boston)

Northeastern University's Doctor of Medical Science is an interdisciplinary degree designed for medical professionals to advance their education and expand their career opportunities through various healthcare concentration areas. Students from diverse healthcare backgrounds share the common goal of developing facility with healthcare systems and becoming leaders within the greater healthcare community.

In addition to taking core courses in healthcare leadership, advocacy, and research methods, students can obtain additional education in one of several areas of specialization. These concentrations are designed to empower graduates from diverse backgrounds with the technical and analytical expertise that is relevant and in high demand in today's healthcare environment. Students will have the opportunity to collaborate with faculty from the Department of Medical Sciences and world-renowned faculty from a variety of interdisciplinary fields within Northeastern and the greater Boston community. This collaboration allows students to access expertise and knowledge across disciplines that will culminate in the creation of an original thesis study.

This degree will take between 16 and 20 months to complete and can be completed fully online. Some concentrations have on-ground curriculum requirements.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Thesis topic approval
Thesis committee
Thesis proposal
Thesis defense

Core Requirements

A grade of B– or higher is required in each course.

Code	Title	Hours
Healthcare Leadership		
MSCI 6001	Principles of Healthcare Advocacy	3
MSCI 6002	Workforce Metrics: Measuring, Comparing, and Privileging the Interprofessional Healthcare Team ⁷	3-4
or HLTH 5800	AI Across the Health Sciences	
MSCI 6003	Healthcare Leadership Seminar	3
PHTH 6204	Society, Behavior, and Health	3
Research		
HLTH 5410	Introduction to Statistics in Health and Behavioral Science	3
MSCI 6900	Research Methods and Design	3
MSCI 6901	Doctoral Writing Seminar	3
MSCI 7990	Thesis	3
Registration in the following course is required if the thesis is not completed by the conclusion of the term of registration for MSCI 7990:		
MSCI 7996	Thesis Continuation - Half-Time ¹	

Concentrations

Completing a concentration is required to complete this program. A minimum of 12 semester hours is required.

- AI Applications (p. 789)
- Business Management (p. 789)
- Exercise Science (p. 790)
- Extreme Medicine (p. 790)
- Health Informatics (p. 790)
- Health Informatics Research (p. 790)
- Health Law (p. 791)
- Interdisciplinary Healthcare Leadership (p. 791)
- Patient Safety (p. 792)
- Public Health (p. 792)

Program Credit/GPA Requirements

Minimum of 36 total semester hours required

Minimum 3.000 GPA required

CONCENTRATION IN AI APPLICATIONS

Code	Title	Hours
Complete 12 semester hours from the following:		12
ARTG 6460	Human-Centered AI	
CS 5047	Exploring AI Trends and Tools	
HLTH 5800	AI Across the Health Sciences ⁸	
PHIL 5110	Responsible AI	

CONCENTRATION IN BUSINESS MANAGEMENT

Code	Title	Hours
Complete a minimum of 12 semester hours from the following:		12
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	
BUSN 6402	Stakeholder Values and Societal Challenges in Business	
ENTR 6250	Lean Design and Development	
FINA 6318	Financial Management	
HINF 5105	The American Healthcare System	
HRMG 6318	Managing the Organization	
INNO 6225	Acquisitions, Alliances, and Growth	
INNO 6318	Innovation Driven Strategy	
MISM 6201	Database Management for Business	
MISM 6202	Foundations of Data Analysis for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MKTG 6318	Customer Value and the Enterprise	
SCHM 6318	Managing Operations and the Supply Chain	
STRT 6318	Strategic Planning for the Future	

CONCENTRATION IN EXERCISE SCIENCE

Code	Title	Hours
Concentration Required ²		
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing ³	3
EXSC 5220	Advanced Exercise Physiology	3
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription	3
Selective		
Complete 3 semester hours from the following:		3
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	

CONCENTRATION IN EXTREME MEDICINE

Code	Title	Hours
Complete a minimum of 12 semester hours.		
Concentration Required		
MSCI 5403 and MSCI 5400	Expedition and Wilderness Medicine Experience and Experiential Reflections: Bridging Theory and Experience ^{4, 6}	3
Complete a minimum of 6 semester hours from the following (students may choose additional courses from the list below and/ or an optional experiential elective to meet the minimum 12-semester-hour program requirement):		6-9
MSCI 5001	Human Factors and Situational Awareness	
MSCI 5002	Crisis Resource Management and Case Studies	
MSCI 5003	Humanitarian Aid Practice and Principles	
MSCI 5004	Humanitarian and Disaster Response Ethics	
MSCI 5005	Care During Conflict	
Optional Elective Experiential Courses ⁵		
MSCI 5401 and MSCI 5400	Human Factors and Situational Awareness Experience and Experiential Reflections: Bridging Theory and Experience ^{4, 6}	
MSCI 5402 and MSCI 5400	Expedition and Cold Weather Medicine Experience and Experiential Reflections: Bridging Theory and Experience ^{4, 5, 6}	
MSCI 5405 and MSCI 5400	Humanitarian Medicine Experience and Experiential Reflections: Bridging Theory and Experience ^{4, 5, 6}	

CONCENTRATION IN HEALTH INFORMATICS

Code	Title	Hours
Concentration Required		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 6220	Database Design, Access, Modeling, and Security	3

HINF 6400	Introduction to Health Data Analytics	3
Selective		
Complete 3 semester hours from the following:		3
HINF 5105	The American Healthcare System	
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6205	Creation and Application of Medical Knowledge	

CONCENTRATION IN HEALTH INFORMATICS RESEARCH

Code	Title	Hours
Concentration Required		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 6220	Database Design, Access, Modeling, and Security	3
HINF 6400	Introduction to Health Data Analytics	3
Selective		
Complete 4 semester hours from the following:		4
CS 6350	Empirical Research Methods	
HINF 5300	Personal Health Interface Design and Development	

CONCENTRATION IN HEALTH LAW

Code	Title	Hours
Concentration Required		
LW 6102	Introduction to Legal Studies 2	3
Selectives		
LW 6102 is a prerequisite for the LW courses listed below. Complete 9 semester hours from the following:		9
LW 6110	Law of Information and Records	
LW 6150	Law and Organizational Management	
LW 6180	Health Law Survey	
LW 6181	Healthcare Regulation and Compliance	
LW 6182	Patient Records, Privacy, and Security	
LW 6210	Special Topics in Employee Rights and Employer Obligations	

CONCENTRATION IN INTERDISCIPLINARY HEALTHCARE LEADERSHIP

Code	Title	Hours
Complete a minimum of 12 semester hours from the following:		12
Artificial Intelligence		
ARTG 6460	Human-Centered AI	
CS 5047	Exploring AI Trends and Tools	
HLTH 5800	AI Across the Health Sciences ⁹	
PHIL 5110	Responsible AI	
Business Management		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	
BUSN 6402	Stakeholder Values and Societal Challenges in Business	
ENTR 6250	Lean Design and Development	
FINA 6318	Financial Management	
HINF 5105	The American Healthcare System	
INNO 6225	Acquisitions, Alliances, and Growth	
INNO 6318	Innovation Driven Strategy	
MISM 6201	Database Management for Business	
MISM 6202	Foundations of Data Analysis for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MKTG 6318	Customer Value and the Enterprise	
SCHM 6318	Managing Operations and the Supply Chain	
STRT 6318	Strategic Planning for the Future	
Exercise Science		

EXSC 5200	Cardiopulmonary Physiology
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing
EXSC 5220	Advanced Exercise Physiology
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription
Extreme Medicine	
MSCI 5001	Human Factors and Situational Awareness
MSCI 5002	Crisis Resource Management and Case Studies
MSCI 5003	Humanitarian Aid Practice and Principles
MSCI 5004	Humanitarian and Disaster Response Ethics
MSCI 5005	Care During Conflict
Health Informatics	
CS 6350	Empirical Research Methods
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5105	The American Healthcare System
HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 5300	Personal Health Interface Design and Development
HINF 5407	Business Application of Decision Support in Healthcare
HINF 6205	Creation and Application of Medical Knowledge
HINF 6220	Database Design, Access, Modeling, and Security
HINF 6400	Introduction to Health Data Analytics
Health Law	
LW 6102	Introduction to Legal Studies 2
LW 6102 is a prerequisite for the following LW courses:	
LW 6110	Law of Information and Records
LW 6150	Law and Organizational Management
LW 6180	Health Law Survey
LW 6181	Healthcare Regulation and Compliance
LW 6182	Patient Records, Privacy, and Security
LW 6210	Special Topics in Employee Rights and Employer Obligations
Patient Safety	
HLTH 5600	Introduction to Patient Safety
HLTH 5600 is a concurrent prerequisite for the following HLTH courses:	
HLTH 5610	Patient Safety Science
HLTH 5620	Leadership, Patient Safety, and Clinician Wellness
HLTH 5630	Quality Improvement in Patient Safety
Pharmacy and Health Systems Science	
PHMD 5575	Pharmaceutical Industry
Public Health	
HLTH 5700	Social Determinants of Health
PHTH 5120	Race, Ethnicity, and Health in the United States
PHTH 5212	Public Health Administration and Policy
PHTH 6200	Principles and History of Urban Health
PHTH 6208	Foundations of Community Health Assessment

CONCENTRATION IN PATIENT SAFETY

Code	Title	Hours
Concentration Required		
HLTH 5600	Introduction to Patient Safety	3
HLTH 5610	Patient Safety Science	3
HLTH 5620	Leadership, Patient Safety, and Clinician Wellness	3
HLTH 5630	Quality Improvement in Patient Safety	3

CONCENTRATION IN PUBLIC HEALTH

Code	Title	Hours
Concentration Required		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Foundations of Community Health Assessment	3

- ¹ Students who have not completed their thesis but have already registered for the required number of thesis hours, and have no remaining coursework to complete the degree, may register for Thesis Continuation—Half-Time (MSCI 7996) in their last semester (including summer term). There is a 1-semester-hour tuition charge for Thesis Continuation—Half-Time (MSCI 7996). Thesis Continuation may be taken only once.
- ² Anatomy and Physiology I and II or equivalent and an exercise physiology or medical background are strongly recommended for the Concentration in Exercise Science.
- ³ Physical Activity and Exercise: Prescription, Measurement, and Testing (EXSC 5210) is offered online with a four-day, on-campus, hands-on lab component in a low-residency format.
- ⁴ Courses are offered in partnership with World Extreme Medicine. Additional expenses may be associated with the experience courses. Offered on-ground in a four-day experiential format.
- ⁵ Some of the optional experiential learning experiences are limited to specific groups of medical or allied health professionals.
- ⁶ One semester hour of Experiential Reflections: Bridging Theory and Experience (MSCI 5400) must be completed for each experience course. Experiential Reflections: Bridging Theory and Experience (MSCI 5400) may be taken concurrently or after the associated courses.
- ⁷ Students who select AI Across the Health Sciences (HLTH 5800) (4 semester hours) versus Workforce Metrics: Measuring, Comparing, and Privileging the Interprofessional Healthcare Team (MSCI 6002) (3 semester hours) will incur an additional 1-semester-hour cost beyond the total program credits.
- ⁸ Students who have completed AI Across the Health Sciences (HLTH 5800) as a core requirement must complete the remaining three courses in the Concentration in AI Applications.
- ⁹ Students who have completed AI Across the Health Sciences (HLTH 5800) as a core requirement may not select this course as part of the Concentration in Interdisciplinary Healthcare Leadership requirements.

Physician Assistant, MS (Boston)

Physician assistants are healthcare providers who practice medicine with physician supervision. They are highly sought after members of the healthcare team who provide diagnostic and therapeutic patient care. The physician assistant studies program is a full-time, two-year graduate program that provides an opportunity to earn a Master of Science degree.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/academics/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Only physician assistant courses approved for this program are permitted to be applied to the requirements of this program. Equivalent courses may not be applied to requirements of this program. Students must follow the program requirements associated with their catalog year.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Capstone project
Summative examination

Core Requirements

A grade of C or higher is required in each course.

Code	Title	Hours
Required Core		
PA 6208	Professional Issues for Physician Assistants	2
PA 6326	Aspects of Primary Care	4
PA 6327	Emergency Medicine and Critical Care	2
PA 6328	Aging and Rehabilitation Medicine	2
PA 6329	Healthcare Delivery	2
PA 6330	Research Design	2
Anatomy and Physiology		
PA 6200	Anatomy and Physiology 1	3

PA 6201	Anatomy and Physiology 2	3
Diagnosis and Evaluation		
PA 6203	Physical Diagnosis and Patient Evaluation 1	3
PA 6204	Physical Diagnosis and Patient Evaluation 2	3
PA 6209	Clinical Laboratory and Diagnostic Methods 1	3
PA 6210	Clinical Laboratory and Diagnostic Methods 2	1
Pharmacology		
PA 6205	Pharmacology 1	2
PA 6206	Pharmacology 2	2
Principles		
PA 6311	Principles of Medicine 1	4
PA 6312	Principles of Medicine 2	4
PA 6313	Principles of Medicine 3	4
PA 6320	Principles of Obstetrics and Gynecology	2
PA 6321	Principles of Surgery	2
PA 6322	Principles of Orthopedics	2
PA 6323	Clinical Neurology	2
PA 6324	Principles of Pediatrics	2
PA 6325	Principles of Psychiatry	2
Clinical		
PA 6400	Applied Clinical Study in Medicine	5
PA 6401	Applied Clinical Study in Ambulatory Medicine	5
PA 6402	Applied Clinical Study in Family Practice	5
PA 6403	Applied Clinical Study in Emergency Medicine	5
PA 6404	Applied Clinical Study in Women's Health	5
PA 6405	Applied Clinical Study in Pediatrics	5
PA 6406	Applied Clinical Study in Surgery	5
PA 6407	Applied Clinical Study in Mental Health	5
PA 6408	Applied Clinical Study Elective	5

Program Credit/GPA Requirements

103 total semester hours required

Minimum 3.000 GPA required

Human Movement and Rehabilitation Sciences, PhD (Boston)

The Department of Physical Therapy, Movement, and Rehabilitation Sciences offers a PhD program in human movement and rehabilitation sciences. The PhD program seeks to prepare graduates to conduct independent (original) basic, translational, and applied research with the goal of creating new knowledge about neuromotor mechanisms and methods of restoring and maximizing human functional capacity and well-being across the life span. The program emphasizes core competencies in motor control and motor learning, movement measurement and analysis, knowledge translation theory, and the use of traditional and emerging technologies. The program is based on the integration of core skills and concepts across the multiple disciplines that are associated with human movement and rehabilitation sciences, coupled with the acquisition of research methodology, analyses, and skills, as well as specialization within specific areas of human movement and rehabilitation research.

The program showcases the unique faculty and research laboratories in human movement and rehabilitation sciences, as well as highly ranked programs in Bouvé College of Health Sciences, the College of Science, and the College of Engineering. Northeastern is dedicated to advancing the field of human movement and rehabilitation sciences and translating research from bench to clinic. Students benefit from our new research laboratories utilizing state-of-the-art movement and rehabilitation methods including virtual reality, ultrasound, neuroscience, neurophysiology, robotics, and movement measurement technologies.

Advanced Entry

Based on a student's background in their preceding master's or clinical doctorate degree, core coursework and total hours for the advanced entry program may vary. The graduate program director will consider all the program requirements and applicants' previous experience when advising students on a plan of study. All students, whether entering from traditional or advanced PhD pathways, will complete the milestones as documented in the curriculum.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Milestones

All students, whether entering from traditional or advanced PhD pathways, will complete the following milestones:

- Annual review
- Qualifying exam
- Dissertation committee
- Dissertation proposal
- Dissertation defense

Core Requirements

Code	Title	Hours
Seminar		
Students must enroll in the following course every semester until start of the dissertation phase of the program (the course is repeatable two times for 1 semester hour and four times for 0 semester hours):		2
PT 7030	Interdisciplinary Seminar in Rehabilitation Science	
Rehabilitation Science and Human Movement		
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
PT 7020	Technologies in Movement and Rehabilitation Science	4

Electives

Code	Title	Hours
Complete 19 semester hours from the list below chosen in consultation with a faculty advisor.		19
Some courses may require prerequisite coursework.		
ARTG 6460	Human-Centered AI	
BIOE 5235	Biomedical Imaging	
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
CAEP 5877	Research Methods in Applied Psychology	
CAEP 6326	Behavioral Concepts and Principles	
CS 5047	Exploring AI Trends and Tools	
EDUT 6150	AI in Education	
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	
HLTH 5450	Healthcare Research	
HLTH 5800	AI Across the Health Sciences	
IE 5630	Biosensor and Human Behavior Measurement	
IE 5640	Data Mining for Engineering Applications	
IE 6500	Human Performance	
IE 7315	Human Factors Engineering	
JRNL 6460	AI in Media Industries	
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 7247	Advanced Control Engineering	
MISM 6250	Strategic AI for Business	
PHIL 5110	Responsible AI	
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6202	Intermediate Epidemiology	
PHTH 6210	Applied Regression Analysis	

PHTH 6440	Advanced Methods in Biostatistics
PT 5138	Neuroscience
PT 5150	Motor Control, Development, and Learning
PT 5209	Neurological Rehabilitation 1
PT 5321	Applications of Biomechanics in Human Function and Movement
PT 6221	Neurological Rehabilitation 2

Dissertation

Code	Title	Hours
PT 9990	Dissertation Term 1	
PT 9991	Dissertation Term 2	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements

Milestones

Annual review

Qualifying exam

Dissertation committee

Dissertation proposal

Dissertation defense

Core Requirements

Based on a student's background in their preceding master's degree, core coursework and total hours for the advanced entry program may vary. The graduate program director will consider the following program requirements when advising students on a plan of study.

Code	Title	Hours
Seminar		
Students must enroll in the following course every semester until the start of the dissertation phase of the program:		2
PT 7030	Interdisciplinary Seminar in Rehabilitation Science (Repeatable 2 times for 1 semester hour and 4 times for 0 semester hours)	
Rehabilitation Science and Human Movement		
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
PT 7020	Technologies in Movement and Rehabilitation Science	4

Electives

Code	Title	Hours
Complete a minimum of 3 semester hours from the following. Some courses may require a prerequisite course:		3-4
ARTG 6460	Human-Centered AI	
BIOE 5235	Biomedical Imaging	
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
CAEP 5877	Research Methods in Applied Psychology	
CAEP 6326	Behavioral Concepts and Principles	
CS 5047	Exploring AI Trends and Tools	
EDUT 6150	AI in Education	
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	
HLTH 5450	Healthcare Research	
HLTH 5800	AI Across the Health Sciences	
IE 5630	Biosensor and Human Behavior Measurement	
IE 5640	Data Mining for Engineering Applications	
IE 6500	Human Performance	
IE 7315	Human Factors Engineering	

JRNL 6460	AI in Media Industries
ME 5250	Robot Mechanics and Control
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 7247	Advanced Control Engineering
MISM 6250	Strategic AI for Business
PHIL 5110	Responsible AI
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6202	Intermediate Epidemiology
PHTH 6210	Applied Regression Analysis
PHTH 6440	Advanced Methods in Biostatistics
PT 5133	Kinesiology
PT 5138	Neuroscience
PT 5150	Motor Control, Development, and Learning
PT 5209	Neurological Rehabilitation 1
PT 5321	Applications of Biomechanics in Human Function and Movement
PT 6221	Neurological Rehabilitation 2
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation

Dissertation

Code	Title	Hours
PT 9990	Dissertation Term 1	
PT 9991	Dissertation Term 2	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Physical Therapy, DPT—Postbaccalaureate Entry (Boston)

Jessica Maxwell, PT, DPT, PhD

Clinical Professor and DPT Program Director

Department of Physical Therapy, Movement, and Rehabilitation Sciences

301 Robinson Hall

Northeastern University

360 Huntington Avenue

Boston, MA 02115

Tel: 617.373.3508

physicaltherapy@northeastern.edu

Our Post Baccalaureate Doctor of Physical Therapy (DPT) (<http://www.northeastern.edu/bouve/pt/programs/pbdpt.html>) program is designed for individuals who hold a minimum of a baccalaureate degree in any major and have satisfied the prerequisite requirements. Over the course of three years, this rigorous curriculum provides didactic and experiential learning experiences, the cornerstone of our program. These experiences include cooperative education, simulated patient interactions, interprofessional education, human cadaver lab, engagement with consumer clients, service-learning, clinical research, and integrated and full-time clinical education experiences.

The DPT program recognizes that becoming a physical therapist is a developmental process that allows students the opportunity to take risks, reflect, learn from mistakes, and continue to grow to promote lifelong learning. We are committed to a process of actively engaged learning that occurs in the classroom, the research laboratory, the community, and clinical settings regionally and internationally. We strive to provide challenging and leading-edge academic content in an environment supportive of professional development. Our educational philosophy is based upon a strong foundation of biological, psychological, social, and clinical sciences; experiential learning; evidence-based practice; cultural agility and humanistic values; and ethical and professional expectations. This is supported by a commitment of promoting and improving the health of clients and society locally, nationally, and globally. Academic content is student-centered and delivered using both traditional and innovative teaching methods including, but not limited to, lectures, small group projects and discussions, multimedia presentations, expert panel discussions, human cadaver lab, problem-based approaches, case studies, faculty-led research, patient simulation, interprofessional education opportunities, virtual and online learning activities, and self-reflection. Experiential learning, a cornerstone of our curriculum, is embedded in academic course requirements including clinical

education, cooperative education, service-learning, and capstone research projects. These experiences are intentional and align with the philosophical underpinnings of Bouvé College and Northeastern University.

We offer a direct guaranteed acceptance for Northeastern undergraduate students interested in continuing their studies in the DPT program. Undergraduate students interested in this pathway can work with their academic advisor to complete the required prerequisite coursework. Application for admission to the DPT for Northeastern students can be found here (<https://bouve.northeastern.edu/programs/post-baccalaureate-physical-therapy-dpt/#h-admissions-requirements>). Students may also be able to participate in physical therapy-related experiential **cooperative education** to gain experience prior to enrolling. Northeastern graduates are eligible for the Double Husky Scholarship when enrolling in the DPT program, which offers a 25% tuition discount.

Please visit our website (<https://bouve.northeastern.edu/physical-therapy/programs/pbdpt/>) to learn more or email PB_DPT_INQUIRIES@northeastern.edu for more information.

The DPT program offers two concentrations that students are eligible to apply for in their first year.

- A pediatric physical therapy concentration designed to enhance the entry-level physical therapy graduate's ability to engage in interprofessional, family centered services with children from infancy through young adulthood in a variety of settings.
- A sports performance concentration designed to prepare the physical therapist student to confidently pursue a sports physical therapy position working with athletes of all ages in a variety of settings. Students take additional coursework and complete focused research and clinical experiences that expand upon the entry-level physical therapy curriculum.
- Both concentrations are beneficial for students who may wish to pursue clinical residency programs in the area of sports or pediatric physical therapy, including the Massachusetts General Hospital/Northeastern University Sports Physical Therapy Residency Program.

Emphasis on Experiential Learning

COOPERATIVE EDUCATION

Our DPT program provides students with six months of full-time experiential learning in addition to the required clinical education experiences necessary for licensure. Through cooperative education, the hallmark of Northeastern, students are able to integrate semesters of academic study with cooperative education experiences in hospitals and clinics throughout the country. Students may be employed as physical therapy co-ops or perform other health-related duties.

As a part of cooperative education experiences, students will be completing an Integrated Clinical Experience during Co-op Work Experience (PT 6964). This experience will provide clinical experience integrated within the didactic portion of the DPT curriculum. Students will observe and/or participate in patient interview, examination, evaluation, intervention, communication, and documentation skills previously learned in the classroom and cooperative educational experiences. Students will have the opportunity to increase their exposure and familiarity in a clinical setting and develop emerging competency in physical therapy skills. Students will demonstrate personal and professional growth and be able to identify learning needs for success on their future first full-time clinical experience.

CLINICAL EDUCATION

The curriculum also includes three rotations for a total of 31 weeks of full-time clinical education under the direct supervision of a licensed physical therapist. We are affiliated with world-class medical centers and clinical sites throughout the United States, providing students with access to master clinicians and clinical scholars. Every effort is made to accommodate individual circumstances, but students should be prepared to travel out of state for two of the three clinical placements. Availability of a car may be required, as most sites are not accessible by public transportation. All expenses associated with clinical education, including travel and housing, are the responsibility of the student.

GLOBAL OUTREACH

Students may participate in short cultural immersion experiences abroad whereby they engage in community service projects under the direction of a physical therapy faculty member or on physical therapy academic exchanges with partner academic institutions.

SERVICE-LEARNING

During the curriculum, students participate in service-learning opportunities in the local community in which they learn and apply skills and knowledge related to program objectives. These opportunities start during the first academic year and continue throughout the program in a variety of settings.

STUDENT RESEARCH

The Department of Physical Therapy, Movement, and Rehabilitation Sciences' research mission is to build the evidence for best practices to maintain and improve the health and well-being of local, national, and global community members. Students have the opportunity to work with faculty to conduct ongoing research in world-renowned medical centers and in one of the eight Department of Physical Therapy, Movement, and Rehabilitation Sciences' labs and centers, including Neuromotor Systems Lab, Laboratory for Locomotion Research, Movement Neuroscience Laboratory, Musculoskeletal Epidemiology and Biomechanics Laboratory, Occupational Biomechanics and Ergonomics Laboratory, Teaching and Learning Innovation Lab, Neuroscience Wet Lab, and the Center for Cognitive and Brain Health Program.

Progression in the DPT Program

To progress in the program, students must maintain acceptable standards of academic performance as stated in the program requirements section, including successful completion of all didactic, integrated clinical education cooperative education and full-time clinical education experiences. Students must demonstrate appropriate skills and professional behaviors to progress in the program. Students must develop appropriate motor

skills, professional behaviors, and emotional maturity as outlined in the essential functions. The program in physical therapy is accredited by the Commission on Accreditation in Physical Therapy Education of the American Physical Therapy Association.

Graduates of the DPT program are eligible to sit for the National Physical Therapy Examination in pursuit of licensure.

PROFESSIONAL BEHAVIORS REQUIREMENT

In order to promote professionalism in the classroom, local and global communities, and clinical settings, the physical therapy program requires the demonstration of professional behaviors in accordance with the professional behaviors policy. The purpose of professional behaviors procedures is to help remediate students who have been identified as having professional behavior issues in an academic, cooperative, or clinical education setting. Professional standards are outlined in the student manual and may include but are not limited to the APTA Code of Ethics for the Physical Therapist (https://www.apta.org/uploadedFiles/APTAorg/About_Us/Policies/Ethics/CodeofEthics.pdf) and/or the APTA Guide for Professional Conduct (http://www.apta.org/uploadedFiles/APTAorg/Practice_and_Patient_Care/Ethics/GuideforProfessionalConduct.pdf).

Any faculty member who has a concern about a student's professional behavior will arrange to meet with the student to discuss the issue. If the faculty member has met with the student and there is satisfactory resolution of the unprofessional conduct, only a form for tracking purposes is needed.

The tracking form shall be kept on record in order to track these students while they are in the program. A request for committee reviews as indicated on the tracking form must occur under the following conditions:

- a. A faculty member has attempted to correct the behavior, and it has not been corrected after meeting with the student and taking initial steps to improve the identified professional behavior issues.
- b. The incident is egregious.
- c. A second breach of professional standards has occurred.

Full Professional Behaviors Violation Review Process

- a. The chairperson of the PTMRS Academic Affairs Committee will send a letter to students about whom concerns have been raised and instruct each student to complete a Self-Assessment of Professional Behaviors. A meeting date will be set to discuss the concern. If the committee finds there is sufficient evidence to support a violation of the professional standards previously defined, one will be noted in the student's record.
- b. The AAC will develop an appropriate remediation plan in collaboration with the student and appropriate faculty.
- c. Depending on the situation, students may have the opportunity to improve professional behaviors.
- d. Any of the following may result in a dismissal from the program:
 - i. A third breach of professional standards
 - ii. A second offense of the same professional standard
 - iii. An egregious breach of a professional standard as outlined in the student manual and/or behaviors that may include but are not limited to violation of the APTA Code of Ethics for the Physical Therapist and/or the APTA Guide for Professional Conduct

If a student believes they have been erroneously, capriciously, or otherwise unfairly treated in the process or decision, they may appeal decisions made by the PTMRS AAC to the chair of PTMRS.

If the student has been suspected of cheating or in any way violating the Academic Code of Conduct, the student will be referred to the AAC as well as Office of Student Conduct and Conflict Resolution. Any concern regarding the student's professional behavior will be brought to the attention of the faculty as appropriate.

Doctor of Physical Therapy Program Goals

STUDENT

1. Demonstrate effective written, verbal, technological, and nonverbal communication skills in all professional settings.
2. Demonstrate leadership and advocacy skills.
3. Demonstrate professional and social responsibility by participating in local, national, and/or global initiatives.

GRADUATE

1. Be clinically competent and culturally sensitive doctors of physical therapy who, guided by the APTA Core Values, excel in patient/client management.
2. Exhibit professionalism, commitment to lifelong learning, and use of evidence-based practice.

Please visit Bouvé College Learning Outcomes (<http://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of C or higher (or "Satisfactory" for experiential education experiences) is required in all courses.

Code	Title	Hours
Foundations		
PT 5101 and PT 5102	Foundations of Physical Therapy and Lab for PT 5101	4
PT 6330 and PT 6331	Functional Anatomy 1 and Lab for PT 6330	3
PT 6340 and PT 6341	Functional Anatomy 2 and Lab for PT 6340	5
PT 6350 and PT 6351	Foundations of PT Examination and Therapeutic Activities and Lab for PT 6350	5
Core		
PT 5138 and PT 5139	Neuroscience and Lab for PT 5138	5
PT 5140	Pathology	4
PT 5150 and PT 5151	Motor Control, Development, and Learning and Lab for PT 5150	5
PT 5160	Psychosocial Aspects of Healthcare	3
PT 5209 and PT 5210	Neurological Rehabilitation 1 and Lab for PT 5209	5
PT 5226	Physical Therapy Professional Seminar 2	2
PT 5500	Pharmacology for Physical Therapy	2
PT 5503 and PT 5504	Cardiovascular and Pulmonary Management and Lab for PT 5503	5
PT 5515 and PT 5516	Integumentary Systems and Lab for PT 5515	3
PT 5540	Clinical Integration 1: Evidence and Practice	2
PT 6221 and PT 6222	Neurological Rehabilitation 2 and Lab for PT 6221	5
PT 6243	Health Education, Promotion, and Wellness	3
PT 6245	Seminar for PT 6243	1
PT 6250	Clinical Integration 2: Evidence and Practice	2
PT 6251	Diagnostic Imaging	3
PT 6305 and PT 6306	Musculoskeletal Management I and Lab for PT 6305	5
PT 6405 and PT 6406	Musculoskeletal Management II and Lab for PT 6405	5
PT 6420	PT Administration and Management within the U.S. Healthcare System	4
PT 6505 and PT 6506	Musculoskeletal Management 3 and Lab for PT 6505	4
PT 6520 and PT 6521	Prosthetic Management and Lab for PT 6520	2
PT 6550	Pediatric Aspects of Life Span Management	3
PT 6555	Geriatric Aspects of Life Span Management	2
PT 6600	Special Topics	2
Clinical		
PT 6441	Clinical Education 1	6
PT 6442	Clinical Education 2	6
PT 6450	Clinical Education 3	8
Research		
PT 6510	Evidence-Based Practice and Research Design	3
PT 6511	Research Methods and Statistics in PT	2

PT 6512	DPT Capstone 1	1
PT 6513	DPT Capstone 2	2
Co-op		
PT 5111	Professional Development for Bouvé Graduate Co-op	1
PT 6964	Co-op Work Experience (taken two semesters)	0

Optional Concentration

- Pediatric Physical Therapy (p. 838)
- Sports Performance (p. 838)

Program Credit/GPA Requirements

123 total semester hours required (138–143 semester hours with optional concentration)

Minimum 3.000 GPA required

Concentration in Pediatric Physical Therapy

Code	Title	Hours
Required		
CAEP 5150	Early Intervention: Family Systems	3
CAEP 5151	Early Intervention: Infant and Toddler Development, Risk, and Disability	3
PT 6512	DPT Capstone 1 ¹	1
PT 6513	DPT Capstone 2 ¹	2
PT 6550	Pediatric Aspects of Life Span Management	3
Complete one of the following:		6-8
PT 6442	Clinical Education 2	
PT 6450	Clinical Education 3	

Concentration in Sports Performance

Code	Title	Hours
Required		
PT 5165	Sports Medicine: Managing the Injured Athlete	4
PT 6237	Advanced Special Topics in Physical Therapy ²	2
PT 6512	DPT Capstone 1	1
PT 6513	DPT Capstone 2	2
Complete one of the following:		6-8
PT 6442	Clinical Education 2	
PT 6450	Clinical Education 3	

¹ Pediatric physical therapy concentration students will be assigned a faculty with expertise in pediatric physical therapy. Pediatric-focused PT project proposals will be reviewed and approved by the director of the pediatric physical therapy concentration in line with current course requirements.

² Sports performance concentration students will be assigned a faculty project in sports, orthopedic, and/or anatomy. PT project proposals will be reviewed and approved by the director of the sports performance concentration in line with current course requirements.

Academic Progression Policies

ACADEMIC STANDING

Students must maintain an overall grade-point average of #3.000 #or higher and successfully complete all professional courses (including cooperative education, integrated clinical education, and full-time clinical education experiences) with a grade of C or better (or Satisfactory for experiential education experiences) to progress into the subsequent semester of professional courses.

PROBATION IN THE PROFESSIONAL PHASE

Students in the professional phase of the program who fail any professional course or whose overall GPA drops below a 3.000 must request to the department's Academic Affairs Committee to be granted a semester of academic probation to remediate the deficiency by the semester deadline set by the PTMRS Academic Standing Committee in order to remain in the Doctor of Physical Therapy program. Failure to request probation in a timely manner will result in a student being dismissed from the program.

A DPT student may only be placed on academic probation for one semester at a time or until the failed course is offered again. A DPT student may only be placed on academic probation a maximum of twice during the entire professional phase of the program.

During probation, students must correct all deficiencies as specified in their respective signed probation plan during the applicable probationary period. Failure to remediate the deficiencies within the agreed-upon time will result in dismissal from the program. During the period of probation, the student must earn a semester GPA of 3.000 or better, or the student will be dismissed from the DPT program. Once the student has successfully completed their probation action plan, they should work with their academic advisor to be removed from probation.

The chair of the department's Academic Affairs Committee may grant a DPT student's request for probation without a formal meeting under the following circumstances:

- The student has not already reached their maximum two semesters of probation.
- The student is in good professional standing with the Professional Behaviors Committee in accordance with the professional behaviors policy.

PROFESSIONAL BEHAVIORS REQUIREMENT

See Progression in the DPT Program located in the overview text.

Academic Dismissal from Major

Students in the DPT program will be dismissed from their major effective the following academic semester for any of the reasons noted below:

- Failure to earn a grade of C or better in a total of three professional courses, regardless of remediation. Within the physical therapy program, each specific professional course (with separate registration number) will be counted as a separate failure even if content is related.
- Failure to remediate a prior deficiency outlined within the probation contract within the agreed-upon time frame.
- Failure to earn the minimum required grade in the same course twice.
- Failure to maintain an overall GPA of 3.000 or higher during the professional phase of the DPT program. Students will be dismissed if they are not eligible for a probationary status.
- Physical therapy students will be permitted only two changes in year of DPT graduation. Any additional changes to year of graduation will result in the student being dismissed from the program.
- Students who do not adhere to the professional standards of the program are violating academic policy and will be dismissed if any of the following occurs:
 - A third breach of professional standards
 - A second offense of the same professional standard
 - Any egregious breach of a professional standard as outlined in the student manual and/or behaviors that may include but are not limited to violation of the APTA Code of Ethics for the Physical Therapist and/or the APTA Guide for Professional Conduct

Appeal of Academic Standing

Students may request, through their academic advisor, to appeal to the chair of the department's Academic Standing Committee to meet with the committee for an exception to the Academic Progression and Probation Policy for DPT program for extenuating or capricious circumstances as provided in the student's respective handbook.

Essential Functions for Physical Therapy Students

The DPT program at Northeastern University is a challenging and intense program, which places specific demands on a student enrolled in the program. The academic rigor of the program closely corresponds to intellectual and physical demands that a graduate will encounter as a practicing physical therapist. Northeastern's DPT program is designed to prepare students to enter the physical therapy profession as a generalist with the skills, knowledge, and ability to successfully perform all the required functions of an entry-level physical therapist. Essential functions are the aptitudes and abilities required of physical therapist students to successfully complete the curriculum of the DPT program and to perform the clinical skills of a physical therapist consistent with patient/client management as detailed in the Guide to Physical Therapy Practice.

The purpose of this document is to delineate the essential functions that are fundamental to the DPT program. Upon admission, students must be able to perform each of the essential functions outlined below during classroom, laboratory, and experiential education learning activities (including, but not limited to, participation in one-on-one interactions, small group discussion and presentation, large group lectures, service-learning, and patient encounters) in both academic, community, and clinical settings.

Students are also required to demonstrate good judgment, responsibility, integrity, sensitivity, and compassion, while simultaneously being able to accurately synthesize and apply knowledge in a timely and safe manner.

Students are required to perform the following essential functions of the DPT program:

Communication Functions

1. Read, understand, and communicate information in written and spoken formats using the English language.
2. Interpret and respond to the verbal, nonverbal, and written communications of others in an appropriate, professional manner.

Affective Functions

1. Establish, value, and continue to develop professional, respectful, empathetic relationships with individuals from all lifestyles, cultures, ages, socioeconomic backgrounds, and abilities.

2. Develop, value, and maintain effective working relationships with faculty, students, professional colleagues, peers, patients/clients, families, and the general public.
3. Meet externally imposed deadlines and time requirements.
4. React effectively in challenging situations with use of appropriate resources.
5. Demonstrate an ability to function effectively in complex, highly stimulating environments.
6. Demonstrate responsibility for self-directed assessment, reflection, and professional growth.
7. Demonstrate core values of honesty, integrity, and accountability for the consequences of one's own actions.
8. Demonstrate ethical behavior, proper judgement, and decision-making skills.

Cognitive Functions

1. Demonstrate self-management skills including planning, organizing, time management, and adhering to legal/regulatory requirements.
2. Use a variety of sources including reading material, lecture, discussion, observation, and physical examinations to:
 - a. Recall, interpret, extrapolate, and apply information
 - b. Measure, analyze, synthesize, and evaluate information
 - c. Gather and prioritize information needed to solve a problem
3. Respond appropriately to emerging problems and potentially hazardous situations by making timely judgments to react effectively and seek assistance when necessary.
4. Accept and apply constructive feedback.

Psychomotor Functions

1. Possess physical strength, stamina, balance, movement, hand-eye coordination, and dexterity required to perform patient care tasks in a manner that does not compromise the safety of self or others.
2. Perform intermittent physical activity of the whole body throughout an 8- to 12-hour period.
3. Engage in complex, coordinated movements needed during a variety of activities including skills lab practice, manual techniques, patient examination, intervention, and guarding.
4. Utilize auditory, visual, and tactile senses to receive information from written, spoken, and nonverbal communication mechanisms; observation of human structures; postures and movements; and equipment and or technology.
5. Quickly and appropriately react to sudden or unexpected events or movements of others.

For further information and clarification, please refer to the Post Baccalaureate Doctor of Physical Therapy (PBDPT) Student Handbook (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Handbooks.aspx>) and Clinical Education Student Manual (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Handbooks.aspx>).

Extended Realities, MS (Boston)

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality.

This program is structured to allow students flexibility and specialization to choose a path that matches their interest. Students have an opportunity to focus on a concentration area that matches their professional background and aspirations.

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their home college. The concentrations are associated with the following colleges:

- Khoury College of Computer Sciences
 - Artificial Intelligence
 - Human Computer Interaction
- D'Amore-McKim School of Business
 - Entrepreneurship
 - Marketing
- Bouvé College of Health Sciences
 - Human Movement Science
- College of Social Sciences and Humanities
 - Information Ethics
 - Public History
- College of Engineering
 - Wireless Networking
- College of Arts, Media and Design

- XR and Design
- XR and Games
- XR and Media

The Master of Science in Extended Realities welcomes students from a diverse range of backgrounds because of the applications of XR technology used in many disciplines and industries including medicine, business, entertainment, architecture, and journalism.

Some concentrations may require a technical background and are noted in the requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Extended Reality Core

Code	Title	Hours
Required Courses		
EXRE 5010 and EXRE 5011	Immersive Media: Extended Realities (XR) History, Theory, and Impact and Seminar for EXRE 5010	5
EXRE 5020	Developing Extended Realities (XR)	4
EXRE 5030	Designing Extended Realities (XR)	4
EXRE 7500 or EXRE 7990	Extended Realities (XR) Project Thesis	4
GSND 5122	Business Models in the Game Industry	1

Extended Reality Concentration Options

Complete one of the following options:

- Artificial Intelligence (p. 176)—Khoury College of Computer Sciences
- Entrepreneurship (p. 176)—D'Amore-McKim School of Business
- Human Computer Interaction (p. 176)—Khoury College of Computer Sciences
- Human Movement Science (p. 176)—Bouvé College of Health Sciences
- Information Ethics (p. 177)—College of Social Sciences and Humanities
- Marketing (p. 177)—D'Amore-McKim School of Business
- Public History (p. 177)—College of Social Sciences and Humanities
- Wireless Networking (p. 178)—College of Engineering
- XR and Design (p. 178)—College of Arts, Media and Design
- XR and Games (p. 178)—College of Arts, Media and Design
- XR and Media (p. 178)—College of Arts, Media and Design

Program Credit/GPA Requirements

34 total semester hours required. Some concentrations may require more than 34 semester hours to complete.

Minimum 3.000 GPA required

CONCENTRATION IN ARTIFICIAL INTELLIGENCE—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Requires a background in computer science.		
CS 5097	Mixed Reality	4
CS 5100	Foundations of Artificial Intelligence	4
CS 6120	Natural Language Processing	4
CS 6140 or DS 5220	Machine Learning Supervised Machine Learning and Learning Theory	4

CONCENTRATION IN ENTREPRENEURSHIP—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
INNO 6200	Enterprise Growth and Innovation	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		

Complete 12 semester hours from the following:

12

ENTR 6210	Managing Operations in Early Stage Ventures
ENTR 6212	Business Planning for New Ventures
ENTR 6214	Social Enterprise
ENTR 6218	Business Model Design and Innovation
ENTR 6240	Emerging and Disruptive Technologies
ENTR 6241	Entrepreneurial Marketing and Selling
ENTR 6250	Lean Design and Development
ENTR 6300	Managing a Technology-Based Business
GE 5030	Iterative Product Prototyping for Engineers
INNO 6230	Platform Innovation
MKTG 6214	New Product Development

CONCENTRATION IN HUMAN COMPUTER INTERACTION—KHOORY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours

Required Courses

CS 5340	Computer/Human Interaction	4

Electives

Complete 12 semester hours from the following:

12

ARTG 5710	Design for Dignity
CS 5097	Mixed Reality
CS 5170	Artificial Intelligence for Human-Computer Interaction
CS 6350	Empirical Research Methods
CS 7390	Special Topics in Human-Centered Computing
GSND 6340	Biometrics of Design

CONCENTRATION IN HUMAN MOVEMENT SCIENCE—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours

Required Courses

GSND 6340	Biometrics of Design	4
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4

Electives

Complete 7–8 semester hours from the following:

7-8

PT 5133	Kinesiology
PT 5150	Motor Control, Development, and Learning
PT 5321	Applications of Biomechanics in Human Function and Movement
PT 5410	Functional Human Neuroanatomy
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation
PT 7020	Technologies in Movement and Rehabilitation Science

CONCENTRATION IN INFORMATION ETHICS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours

Required Courses

Complete 8 semester hours from the following:

8

CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
PHIL 5005	Information Ethics
PHIL 5010	AI Ethics

Electives

Complete 8 semester hours from the following:

8

CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
PHIL 5001	Global Justice
PHIL 5002	Ethics and Public Policy
PHIL 5005	Information Ethics
PHIL 5010	AI Ethics

CONCENTRATION IN MARKETING—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

CONCENTRATION IN PUBLIC HISTORY—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
HIST 5237	Issues and Methods in Public History	4
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1 (to be taken twice)	
Electives		
Complete 8 semester hours from the following:		8
HIST 5241	Exhibits and Museums	
HIST 7250	Topics in Public History (Public History and Slavery)	
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)	

CONCENTRATION IN WIRELESS NETWORKING—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
EECE 5512	Networked XR Systems	
EECE 7374	Fundamentals of Computer Networks	
Electives		
Complete 8 semester hours from the following:		8
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	

CONCENTRATION IN XR AND DESIGN—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5640	Prototyping for Experience Design	4
EXRE 6500	Extended Realities (XR) Studio	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 6110	Information Design Theory and Critical Thinking	

ARTG 6310	Design for Behavior and Experience
ARTG 6330	Information Design Mapping Strategies

CONCENTRATION IN XR AND GAMES—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110	5
Electives		
Complete 8 semester hours from the following:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6001	Advanced Topics in Game Science	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6330	Player Experience	
GSND 6340	Biometrics of Design	
GSND 6350	Data-Driven Game Design	
GSND 6460	Generative Game Design	

CONCENTRATION IN XR AND MEDIA—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics	
JRNL 6341	Telling Your Story with Data	

Plan of Study

Sample Plan of Study

The following is a sample plan of study for a student in the Concentration in XR and Games.

Year 1			
Fall	Hours	Spring	Hours
EXRE 5010 and EXRE 5011		5 EXRE 5030	4
EXRE 5020		4 GSND 5110 and GSND 5111	5
		9	9
Year 2			
Fall	Hours	Spring	Hours
EXRE 6500		4 EXRE 7500	4
GSND 5122		1 XR and games elective 2	4
XR and games elective 1		4	
		9	8
Total Hours: 35			

Human Movement and Rehabilitation Sciences, MS (Boston)

A strong global need exists for interdisciplinary, innovative, and translational research and practice directed toward improving quality of life and participation of all people in our communities. To meet this need, we offer a novel Master of Science in Human Movement and Rehabilitation Sciences. Human movement and rehabilitation sciences encompasses a broad range of topics including sports performance, functional assessments, occupational biomechanics and ergonomics, motor control and learning, neuroscience, musculoskeletal disorders, orthopedics, aging, assistive technology, injury prevention and rehabilitation, communication sciences, speech, and early development.

The objective of this program is to prepare graduates to assist in advancing basic, translational, and applied research, as well as practice in human movement and rehabilitation sciences. The program is based on the integration of core skills and concepts across the multiple disciplines that are associated with human movement and rehabilitation sciences, coupled with the acquisition of skills and tools, and specialization within specific areas and concentrations in AI applications and exercise science.

The Master of Science in Human Movement and Rehabilitation Sciences program is housed in the Department of Physical Therapy, Movement, and Rehabilitation Sciences, offering excellent collaborative teaching and research programs across the departments and school of the Bouvé College of Health Sciences, the Khoury College of Computer Sciences, the College of Engineering, and the College of Science. The 12-month program requires 32 semester hours of required and elective courses, including 4 semester hours devoted to the capstone project.

Please visit Bouvé College Learning Outcomes (<http://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Seminar		
PT 7030	Interdisciplinary Seminar in Rehabilitation Science	1
Rehabilitation Science and Human Movement		
Complete one of the following:		4
PT 5170 and PT 5171	Motor Control and Lab for PT 5170	
PT 5321	Applications of Biomechanics in Human Function and Movement	
Complete the following:		
PT 6230	Capstone Project: Human Movement and Rehabilitation Sciences	4
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
PT 7020	Technologies in Movement and Rehabilitation Science	4

Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- AI Applications (p. 845)
- Exercise Science (p. 846)
- Electives Option (p. 846)

Program Credit/GPA Requirements

Minimum 32 total semester hours required

Minimum 3.000 GPA required

CONCENTRATION IN AI APPLICATIONS

Code	Title	Hours
Complete a total of 12 semester hours for this concentration.		
HLTH 5800	AI Across the Health Sciences	4
Complete 8 semester hours from the following:		8
ARTG 6460	Human-Centered AI	

CS 5047	Exploring AI Trends and Tools
PHIL 5110	Responsible AI

CONCENTRATION IN EXERCISE SCIENCE

Code	Title	Hours
Complete 12 semester hours from the following:		12
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	
EXSC 5220	Advanced Exercise Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	
EXSC 5240	Clinical Nutrition Applications in Health and Disease	
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription	
EXSC 6400	Applied Research Methods	

ELECTIVES OPTION

Code	Title	Hours
Some courses may require prerequisite coursework.		
Complete 12 semester hours from following (students must petition to take electives outside the approved list):		12
BIOE 5235	Biomedical Imaging	
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
CAEP 6326	Behavioral Concepts and Principles	
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	
EXSC 5220	Advanced Exercise Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	
EXSC 5240	Clinical Nutrition Applications in Health and Disease	
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription	
HLTH 5410	Introduction to Statistics in Health and Behavioral Science	
HLTH 5450	Healthcare Research	
IE 5630	Biosensor and Human Behavior Measurement	
IE 6500	Human Performance	
IE 7315	Human Factors Engineering	
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 7247	Advanced Control Engineering	
PHTH 5202	Introduction to Epidemiology	
PHTH 6202	Intermediate Epidemiology	
PHTH 6210	Applied Regression Analysis	
PHTH 6440	Advanced Methods in Biostatistics	
PT 5138	Neuroscience	
PT 5150	Motor Control, Development, and Learning	
PT 5209	Neurological Rehabilitation 1	
PT 5410	Functional Human Neuroanatomy	
PT 6221	Neurological Rehabilitation 2	

Extreme Medicine, Graduate Certificate (Boston)**Overview**

The Graduate Certificate in Extreme Medicine is an interprofessional program designed to prepare healthcare professionals to provide medical services in austere conditions. The core didactic courses are delivered online and provide foundational instruction in human factors, crisis resource management, efficiency of highly skilled teams, and theory and ethics of care in humanitarian crises.

In addition to the online courses, students take one or more on-ground experiential courses offered in an executive format. Experiential courses enable students to complete intensive, hands-on training and apply the principles of extreme medicine. This program is offered in collaboration with World Extreme Medicine (WEM (<https://worldextrememedicine.com/>)).

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/academics/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Core Requirements

A grade of B– or higher is required in each of the following:

Code	Title	Hours
Complete a minimum of 6 semester hours from the following courses. Students may choose additional courses from the list below and/or an optional experiential elective to meet the minimum 12 SH program requirement.		6-9
MSCI 5001	Human Factors and Situational Awareness	
MSCI 5002	Crisis Resource Management and Case Studies	
MSCI 5003	Humanitarian Aid Practice and Principles	
MSCI 5004	Humanitarian and Disaster Response Ethics	
MSCI 5005	Care During Conflict	

Experiential Coursework

Code	Title	Hours
Required Experiential Courses		
MSCI 5403 and MSCI 5400	Expedition and Wilderness Medicine Experience and Experiential Reflections: Bridging Theory and Experience	3
Optional Experiential Electives		
The following experiential courses are optional, but each requires one additional SH of MSCI 5400.		
MSCI 5401 and MSCI 5400	Human Factors and Situational Awareness Experience and Experiential Reflections: Bridging Theory and Experience ¹	
MSCI 5402 and MSCI 5400	Expedition and Cold Weather Medicine Experience and Experiential Reflections: Bridging Theory and Experience ¹	
MSCI 5405 and MSCI 5400	Humanitarian Medicine Experience and Experiential Reflections: Bridging Theory and Experience ¹	

¹ Courses are offered in partnership with World Extreme Medicine (WEM (<https://worldextrememedicine.com/>)). Additional expenses may be associated with the experience courses.
One semester hour of Experiential Reflections: Bridging Theory and Experience (MSCI 5400) must be completed for each experiential course.
Some optional experiential courses may be restricted to licensed or credentialed professionals or to students in the last two years of study in a medical or allied health professional program.
Offered on ground in a 4-day experiential format.

After completion of the 12 required semester hours, students are eligible to register for any of the remaining courses using Bouvé College's Special Student (<https://registrar.northeastern.edu/article/non-matriculated-registration/>) registration process.

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

School of Community Health and Behavioral Sciences

Website (<https://bouve.northeastern.edu/academics/school-of-community-health-and-behavioral-sciences/applied-psychology/>)

Jonathan Zaff, PhD

Professor and Chair

Department of Applied Psychology

617.373.2485

617.373.8892 (fax)

Website (<https://bouve.northeastern.edu/academics/school-of-community-health-and-behavioral-sciences/public-health-and-health-sciences/>)

Robert Leeman, PhD

Professor and Chair

Department of Public Health and Health Sciences

617.373.3501

617.373.2968 (fax)

r.leeman@northeastern.edu

The School of Community Health and Behavioral Sciences offers students interdisciplinary education and research excellence—drawing on novel health technologies and data literacy to address society's most pressing public health issues.

Students in the school are prepared to be the next generation of innovators and thought leaders in the health professions and public health. They will have an opportunity to be empowered to affect real change by leveraging new and emerging technologies and data.

The school is designed to improve individuals, communities, and society through three pillars of excellence:

- Health technologies
- Public mental health
- Social and environmental determinants of health to achieve social justice

Department of Applied Psychology

Graduate programs in the Department of Applied Psychology (including a doctoral program in counseling psychology and a doctoral program in school psychology that are accredited by the American Psychological Association) reflect Northeastern University's tradition of practice-oriented education with an ecological and multicultural focus. Faculty and students come from diverse ethnic and cultural backgrounds, providing an enriching learning experience in which students work with faculty who are national and world leaders in various areas of mental and behavioral health. The department is a scientist-practitioner-based unit that generates new psychological knowledge through research and the translation of research to applications that promote mental and physical health across the life span.

We offer leading licensure-focused master's programs in applied behavioral analysis, counseling psychology, and school psychology. In addition, we offer a master's in applied psychology, certificates in applied psychology and early intervention, and undergraduate minors in health psychology and mindfulness. Consistent with Northeastern, the Department of Applied Psychology emphasizes experiential and field-based learning in schools, community organizations, and private practices and the integration of science and practice. We prepare students to become mental and behavioral health professionals in a variety of educational, government, community, organizational, and private settings. Our doctoral programs provide excellent educational opportunities for those interested in mental and behavioral health research with specialized training for future careers in academic or practice positions as licensed psychologists.

Doctor of Philosophy (PhD)

- Counseling Psychology (Boston) (p. 849)
- School Psychology (Boston) (p. 851)

Certificate of Advanced Graduate Studies (CAGS)

- School Psychology (Boston) (p. 853)

Master of Science (MS)

- Applied Behavior Analysis (Boston) (p. 854)
- Applied Behavior Analysis (Charlotte) (p. 856)
- Applied Educational Psychology (Boston) (p. 858)
- Applied Psychology (Boston) (p. 859)

Master of Science in Counseling Psychology (MSCP)

- Counseling Psychology (Boston) (p. 860)

Graduate Certificate

- Applied Psychology in Context (Boston) (p. 812)
- Early Intervention (Boston) (p. 813)

Department of Public Health and Health Sciences

The Department of Public Health and Health Sciences in the Bouvé College of Health Sciences at Northeastern University provides a unique, transdisciplinary setting that incorporates academics, research, and practice and seeks to prepare students for a wide range of career paths. We offer two accredited bachelor's degrees in health sciences and public health; joint bachelor's degrees with the School of Law; and options for combined majors with the D'Amore-McKim School of Business, the College of Social Sciences and Humanities, the College of Science, the College of Engineering, and the Khoury College of Computer Sciences. In addition, the department offers minors in exercise science, public health, global health, and nutrition. We also offer several graduate degrees: Master of Public Health, Master of Science in Health Informatics in collaboration with Khoury College of Computer Sciences, and a combined master's in the two fields. Our Master of Public Health program is offered part time, full time, as a one-year accelerated online program, and at our Charlotte campus as a primarily online program with an intensive, one-week residency program. At the doctoral level, we offer a PhD program in population health and, in cooperation with Khoury, a PhD in personal health informatics.

Our diverse faculty has expertise in the fields of biostatistics/data science, community and rural health, environmental health, epidemiology, global health, health promotion and education, health policy, health technology, mental health, and more. Students have the opportunity to work side by side with faculty in conducting cutting-edge research in these fields.

In line with Northeastern's commitment to interdisciplinary research and urban engagement, we teach and work closely with many other schools, centers, and institutes in the university including the Institute for Health Equity and Social Justice Research; the Center for Community Health Education, Research and Service; the Social Science Environmental Health Research Institute; and the Center for Health Policy and Healthcare Research; as well as community agencies and neighborhood health centers in the local Boston area and beyond.

Doctor of Philosophy (PhD)

- Personal Health Informatics (Boston) (p. 339)
- Population Health (Boston) (p. 866)

Master of Public Health (MPH)

- Public Health (Boston) (p. 869)
- Public Health (Charlotte) (p. 871)
- Public Health—Accelerated (Boston) (p. 872)

Master of Science (MS)

- Complex Network Analysis (Boston) (p. 166)
- Health Data Analytics—Online (p. 800)
- Health Informatics (Boston) (p. 447)
- Health Informatics (Vancouver) (p. 450)
- Statistics (Boston) (p. 187)
- Statistics—Connect (Boston) (p. 189)

Dual Degree

- Law, JD/Public Health, MPH (Boston) (p. 810)
- Pharmacy, PharmD (p. 811)—Direct Entry/Public Health, MPH (Boston)
- Public Health, MPH/Health Informatics, MS (Boston) (p. 811)

Graduate Certificates

- AI Applications (Boston) (p. 190)
- Health Informatics Management and Exchange (Boston) (p. 815)

Counseling Psychology, PhD (Boston)

The Doctor of Philosophy in Counseling Psychology program is accredited by the American Psychological Association (APA). It is designed to train the next generation of mental health professionals. The program offers doctoral education and training in psychology and seeks to prepare students for entry-level practice in counseling psychology. Doctoral-level counseling psychologists conduct research, teach at the university level, supervise students and professionals, consult with community agencies, and provide clinical services to people across the developmental life span. Counseling psychologists also enhance the science of health promotion and health psychology and emphasize community-based interventions. It is the mission of the PhD in Counseling Psychology program to train multiculturally competent counseling psychologists who are clinically adept in multiple settings with a variety of psychological and health-related issues and who are able to conceptualize, conduct, and evaluate research across biological, cultural, and relational systems in numerous social contexts, such as families, schools, neighborhoods, and communities.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review

Four qualifying examinations completed in the first three years—research, ethics, assessment, and intervention

Research team during the first year (two consecutive semesters)

Dissertation committee

Dissertation proposal

Dissertation defense

Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Basic		
CAEP 6390	History and Systems of Psychology	3
CAEP 6394	Advanced Multicultural Psychology	3
CAEP 7750	Biological Bases of Behavior	3
CAEP 7755	Cognitive and Affective Bases of Behavior	3
CAEP 7756	Social Psychology in an Organizational and Ecological Context	3
Fieldwork		
Complete 8 semester hours from the following:		8
CAEP 7741	Advanced Practicum 1	
CAEP 7742	Advanced Practicum 2	
CAEP 7743	Advanced Practicum 3	
CAEP 7744	Advanced Practicum 4	
Clinical		
CAEP 6350	Introduction to Cognitive Assessment	3
CAEP 6352	Personality Assessment	3
CAEP 6360	Consultation and Program Evaluation	3
CAEP 7710	Advanced Clinical Assessment	3
CAEP 7720	Advanced Clinical Interventions	3
CAEP 7758	Doctoral Seminar in Contemporary Theories of Psychotherapy	3
Elective		
Three semester hours can be chosen from any graduate level CAEP course or combination of graduate level CAEP courses outside of the PhD in Counseling Psychology program of study. Other electives may be chosen upon approval of the program director and faculty adviser.		3
Professional		
Complete 6 semester hours from the following:		6
CAEP 7701	Doctoral Seminar in Counseling Psychology (Repeatable 3 times for 1 credit and 3 times for 0 credits)	
CAEP 7732	Legal and Ethical Issues in Community and Educational Settings	
Research		
CAEP 7711	Measurement: Advanced Psychometric Principles	3
CAEP 7712	Intermediate Statistical Data Analysis Techniques	3
CAEP 7716	Advanced Research and Data Analyses 2	3
Internship		
Complete 3 semester hours. Prior to beginning internship consult with director, DCT, and/or the Doctoral Internship Seminar instructor.		3
CAEP 7798	Doctoral Internship	
Dissertation		
Code	Title	Hours
CAEP 9990	Dissertation Term 1	
CAEP 9991	Dissertation Term 2	

Program Credit/GPA Requirements

62 total semester hours required
Minimum 3.000 GPA required

School Psychology, PhD (Boston)

Northeastern University's Doctor of Philosophy in School Psychology program is accredited by the American Psychological Association and the National Association of School Psychologists. The program is designed to prepare the next generation of leaders in school psychology. The ecological perspective and scientist-practitioner training model provide the foundation for the program's educational goals. Students have an opportunity to learn how to conduct research, to use research to inform practice, and to contribute to the scientific foundation of professional practice.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Comprehensive examination
Annual review
Mentored research project
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Professional		
CAEP 6365	Seminar in School Psychology	3
CAEP 7702	Scholarship, Teaching, and Leadership in Applied Psychology	3
CAEP 7732	Legal and Ethical Issues in Community and Educational Settings	3
Basic		
CAEP 6206	Learning Principles	3
CAEP 6218 or CAEP 6220	Infant, Child, and Adolescent Development Development Across the Life Span	3
CAEP 6390	History and Systems of Psychology	3
CAEP 7750	Biological Bases of Behavior	3
CAEP 7755	Cognitive and Affective Bases of Behavior	3
CAEP 7756	Social Psychology in an Organizational and Ecological Context	3
<i>Elective Course</i>		
Complete a total of 3 semester hours with faculty advisor's prior approval.		3
Multicultural Competency		
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6394	Advanced Multicultural Psychology	3
Assessment and Intervention		
<i>Coursework</i>		
CAEP 6247	Child and Adolescent Psychopathology	3
CAEP 6345	Promoting Youth Academic Success in Schools	3
CAEP 6347	Behavior Management	3
CAEP 6350	Introduction to Cognitive Assessment	3
CAEP 6353	Curriculum-Based Assessment and Data-Based Decision Making	3
CAEP 6354	Social, Emotional, and Behavioral Assessment	3
CAEP 6360	Consultation and Program Evaluation	3
CAEP 6401	Counseling Children and Adolescents in Schools	3
CAEP 6402	Promoting Social, Emotional, and Behavioral Success in Schools	3
<i>Practicum</i>		

CAEP 6400	Prepracticum in School Psychology	1
CAEP 6999	Practicum Continuation	0
CAEP 8415	Practicum in School Psychology 1	2
CAEP 8416	Practicum in School Psychology 2	2

Fieldwork

Complete a minimum of 2 semester hours required per course, for a total of 8 semester hours:

CAEP 7741	Advanced Practicum 1	2
CAEP 7742	Advanced Practicum 2	2
CAEP 7743	Advanced Practicum 3	2
CAEP 7744	Advanced Practicum 4	2

Internship

Complete 3 semester hours. Prior to beginning internship consult with director, DCT, and/or the Doctoral Internship Seminar instructor.

CAEP 7798	Doctoral Internship	

Research

CAEP 6202	Research, Evaluation, and Data Analysis	3
or NRSR 7712	Quantitative Research Methods	
CAEP 6328	Single-Case Research Design	3
CAEP 7703	Grant Writing in the Health Professions	3
CAEP 7711	Measurement: Advanced Psychometric Principles	3
CAEP 7712	Intermediate Statistical Data Analysis Techniques	3
CAEP 7716	Advanced Research and Data Analyses 2	3

Dissertation

Code	Title	Hours
CAEP 9990	Dissertation Term 1	
CAEP 9991	Dissertation Term 2	

Program Credit/GPA Requirements

97 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements

Students who enter with a master's degree develop an individualized program of study with their advisor, which requires a minimum of 50 semester hours of credit.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Comprehensive examination

Annual review

Mentored research project

Dissertation committee

Dissertation proposal

Dissertation defense

Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Complete 50 semester hours of approved coursework. Consult your faculty adviser for acceptable courses.		50

Dissertation

Code	Title	Hours
Complete the following (repeatable) course twice:		
CAEP 9990	Dissertation Term 1	
CAEP 9991	Dissertation Term 2	

Program Credit/GPA Requirements

50 total semester hours required
Minimum 3.000 GPA required

School Psychology, CAGS (Boston)

Northeastern University's Certificate of Advanced Graduate Study in School Psychology is approved by the National Association of School Psychologists and the Massachusetts Department of Elementary and Secondary Education. The overarching purpose of the program is to develop highly competent school psychologists. Some students also choose to concentrate in applied behavior analysis or concurrently enroll in the Graduate Certificate in Early Intervention (p. 813). The option to concurrently enroll in early intervention training is designed to prepare school psychologists to work with infants and toddlers and their families in community and related agencies, on interdisciplinary teams, and on the transition to school. The applied behavior analysis concentration is designed to prepare school psychologists to address the learning and behavioral needs of children and adolescents with challenging behaviors in school, home, and community settings, including children with autism spectrum disorders.

Please see also the Master of Science in Applied Educational Psychology (p. 858) program.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B or higher is required in all coursework.

Code	Title	Hours
Clinical/Applied		
CAEP 6345	Promoting Youth Academic Success in Schools	3
CAEP 6347	Behavior Management	3
CAEP 6353	Curriculum-Based Assessment and Data-Based Decision Making	3
CAEP 6354	Social, Emotional, and Behavioral Assessment	3
CAEP 6401	Counseling Children and Adolescents in Schools	3
CAEP 6402	Promoting Social, Emotional, and Behavioral Success in Schools	3
Elective course (with faculty advisement) ¹		3
Practicum		4
CAEP 8415	Practicum in School Psychology 1	2
CAEP 8416	Practicum in School Psychology 2	2
CAEP 6999	Practicum Continuation	0
Internship		
Complete 6 semester hours from the following:		6
CAEP 8501	Internship in School Psychology 1	
CAEP 8502	Internship in School Psychology 2	

¹ Courses taken to fulfill the optional concentration may be used to fulfill the elective requirement.

Optional Concentration

APPLIED BEHAVIOR ANALYSIS

Code	Title	Hours
CAEP 6326	Behavioral Concepts and Principles	3
CAEP 6327	Behavior Assessment	3
CAEP 6329	Ethics for Behavior Analysts	3
CAEP 6336	Systematic Inquiry 1	3

Optional Intensive Practicum

An intensive practicum is optional in this concentration. Consult your faculty advisor.

CAEP 8417	Intensive Practicum in Applied Behavior Analysis 1	2
CAEP 8418	Intensive Practicum in Applied Behavior Analysis 2	2
CAEP 8419	Intensive Practicum in Applied Behavior Analysis 3	2
CAEP 8421	Intensive Practicum in Applied Behavior Analysis 4	2

Program Credit/GPA Requirements

31 total semester hours required
Minimum 3.000 GPA required

Applied Behavior Analysis, MS (Boston)

The Master of Science in Applied Behavior Analysis program is designed to equip graduates with the skills to provide effective, compassionate behavior analytic services to students and clients across the life span in a variety of settings. Students are provided with flexible options to meet coursework and supervised fieldwork requirements to be eligible to take the Board Certified Behavior Analyst (BCBA®) examination. Courses explore the principles and procedures of applied behavior analysis in-depth and address its scientific and philosophical underpinnings. With this background, successful graduates are prepared to address the most complex behavior problems and learning challenges.

Curriculum

The program requires completion of a 30-semester-hours course sequence and offers an option to add on up to 4 semester-hours to accrue further supervision at Northeastern University. The required sequence includes eight core courses, two experiential learning courses, and two courses that will guide students through completion of a scholarly project.

Courses are delivered in online or hybrid formats, with the majority of work being able to be completed asynchronously. Specific courses also include optional or required in-person or synchronous remote meeting times.

EXPERIENTIAL LEARNING AND INTENSIVE PRACTICUM

Required experiential learning courses Experiential Learning in Skill Acquisition (CAEP 8412) and Experiential Learning in Behavioral Supervision (CAEP 8413) and optional intensive practicum courses Intensive Practicum in Applied Behavior Analysis 1 (CAEP 8417) and Intensive Practicum in Applied Behavior Analysis 2 (CAEP 8418) are offered to give students practice engaging in behavior analytic activities. Additionally, students may elect to accrue their supervised fieldwork requirement toward BCBA® eligibility through these classes.

PROJECT-BASED COURSES

During the final year of the program students will enroll in Systematic Inquiry in Behavior Analysis 1 (CAEP 7412) and Systematic Inquiry in Behavior Analysis 2 (CAEP 7413). This set of courses is designed for students to progressively complete a scholarly project. Students will be able to select the type of project. The outcome of the first semester will be a presented proposal, and a final written report will be the outcome of the second semester.

Programs of Study

Students who follow either sample program of study, taking 6 semester hours per academic term, will complete the Master of Science in Applied Behavior Analysis in 20 months. Courses are offered during the fall, spring, and full summer semesters with each course being offered twice per year.

Alternative options to this program of study may include:

- Completing the program in four semesters (16 months)—this involves taking 9 semester hours for two semesters and 6 semester hours for two semesters.
- Completing the program in more than five semesters—this involves taking 3 semester hours for some or all of the semesters during the program.
- Enrolling in optional intensive practicum courses—this involves adding up to two additional courses to the program of study to accrue additional supervised fieldwork hours while enrolled in the program.

Students planning on changing their program of study must complete an Alternative Program of Study form and have it approved by their faculty advisor to avoid semesters where courses they need are not offered.

Policies and Procedures

Please see Bouvé College of Health Sciences Academic Policies and Procedures (<https://catalog.northeastern.edu/graduate/health-sciences/academic-policies-procedures/>). Program-specific policies follow below.

GRADING, ACADEMIC PROBATION, AND ACADEMIC DISMISSAL

If a student earns a grade of B– or lower, they will be placed on academic probation. In order to return to nonprobationary status, the student must retake the course during the next semester in which it is offered and earn a B or better. Failure to do so or earning a B– or below in any remaining course will result in dismissal from the Master of Science in Applied Behavior Analysis program.

COURSE PROGRESSION

Students are expected to register for at least one course per academic term. In order to take a semester off (including the full summer semester), students must contact their faculty advisor to inform them of the timeline and apply for a leave of absence. Students who do not apply for a leave of absence prior to skipping a semester may need to reapply when returning to their coursework.

Program Requirements

Students must complete all core, experiential learning, and project-based courses to successfully complete the program.

Core Courses

Students enrolled in the program should pass Behavioral Concepts and Principles (CAEP 6326) and Ethics for Behavior Analysts (CAEP 6329) prior to registering for other courses unless otherwise advised.

Code	Title	Hours
CAEP 6326	Behavioral Concepts and Principles	3
CAEP 6327	Behavior Assessment	3
CAEP 6328	Single-Case Research Design	3
CAEP 6329	Ethics for Behavior Analysts	3
CAEP 6341	Behavioral Interventions	3
CAEP 6342	Consultation, Supervision, and Management	3
CAEP 6343	Radical Behaviorism and Verbal Behavior	3
CAEP 6344	Experimental Analysis of Behavior	3

Experiential Learning Course

Experiential learning courses require students to have a site at which they are able to complete behavior analytic projects. There are additional requirements for students wishing to accrue supervised fieldwork hours through these courses.

The semester prior to the onset of each of these classes, the director of supervision will connect with students to confirm arrangements of an adequate worksite to complete all required activities and meeting availability. It is the responsibility of the student to comply with all deadlines throughout this process, or they will not be permitted to enroll in the course.

A grade of Satisfactory (S) is required for each of these courses.

Code	Title	Hours
CAEP 8412	Experiential Learning in Skill Acquisition	2
CAEP 8413	Experiential Learning in Behavioral Supervision	2

Project-Based Courses

The project-based courses are designed to be taken concurrently so that students are guided through completion of a scholarly project. Prior to enrolling in Systematic Inquiry in Behavior Analysis 1 (CAEP 7412), students will work with faculty to plan for their project.

Code	Title	Hours
CAEP 7412	Systematic Inquiry in Behavior Analysis 1	1
CAEP 7413	Systematic Inquiry in Behavior Analysis 2	1

Optional Courses

Students may elect to take up to two intensive practicum courses to fulfill additional supervised fieldwork hours. In order to register for these classes, students must complete all preparation tasks the semester prior to enrollment.

These courses can be started during the student's second semester in the program. They cannot be taken at the same time as experiential learning courses Experiential Learning in Skill Acquisition (CAEP 8412) and Experiential Learning in Behavioral Supervision (CAEP 8413).

Contact the director of supervision for additional information and preparation tasks.

Code	Title	Hours
CAEP 8417	Intensive Practicum in Applied Behavior Analysis 1	2
CAEP 8418	Intensive Practicum in Applied Behavior Analysis 2	2

Program Credit/GPA Requirements

30 total semester hours required

Grade of B or higher required in each course, unless otherwise indicated

Minimum 3.000 GPA required

Plan of Study

Sample Program of Study—Fall Entry

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
CAEP 6326		3 CAEP 6327		3 CAEP 6341	3
CAEP 6329		3 CAEP 6328		3 CAEP 6342	3
		6		6	6
Year 2					
Fall	Hours	Spring	Hours		
CAEP 6343		3 CAEP 6344		3	
CAEP 7412		1 CAEP 7413		1	
CAEP 8412		2 CAEP 8413		2	
		6		6	

Total Hours: 30

Sample Program of Study—Spring Entry

Year 1					
		Spring	Hours	Summer Full Semester	Hours
		CAEP 6326		3 CAEP 6327	3
		CAEP 6329		3 CAEP 6328	3
				6	6
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
CAEP 6341		3 CAEP 6343		3 CAEP 6344	3
CAEP 6342		3 CAEP 7412		1 CAEP 7413	1
		CAEP 8412		2 CAEP 8413	2
		6		6	6

Total Hours: 30

Applied Behavior Analysis, MS (Charlotte)

The Master of Science in Applied Behavior Analysis program is designed to equip graduates with the skills to provide effective, compassionate behavior analytic services to students and clients across the life span in a variety of settings. Students are provided with flexible options to meet coursework and supervised fieldwork requirements to be eligible to take the Board Certified Behavior Analyst (BCBA®) examination. Courses explore the principles and procedures of applied behavior analysis in-depth and address its scientific and philosophical underpinnings. With this background, successful graduates are prepared to address the most complex behavior problems and learning challenges.

Curriculum

The program requires completion of a 30-semester-hour course sequence and offers an option to add on up to 4 semester hours to accrue further supervision at Northeastern University.

Courses are delivered in online or hybrid formats, with the majority of work able to be completed asynchronously. Specific courses also include optional or required in-person or synchronous remote meeting times.

INTENSIVE PRACTICUM

Optional intensive practicum courses are offered to give students practice engaging in behavior analytic activities. Additionally, students may elect to accrue their supervised fieldwork requirement toward BCBA® eligibility through these classes.

Programs of Study

Courses are offered during the fall, spring, and full summer semesters with each course being offered twice per year.

Alternative options to this program of study may include:

- Completing the program in four semesters (16 months)—this involves taking 9 semester hours for two semesters and 6 semester hours for two semesters.
- Completing the program in more than five semesters—this involves taking 3 semester hours for some or all of the semesters during the program.

- Enrolling in optional intensive practicum courses—this involves adding up to two additional courses to the program of study to accrue additional supervised fieldwork hours while enrolled in the program.

Students planning on changing their program of study must complete an Alternative Program of Study form and have it approved by their faculty advisor to avoid semesters where courses they need are not offered.

Policies and Procedures

Please see Bouvé College of Health Sciences Academic Policies and Procedures (<https://catalog.northeastern.edu/graduate/health-sciences/academic-policies-procedures/>). Program-specific policies follow below.

GRADING, ACADEMIC PROBATION, AND ACADEMIC DISMISSAL

If a student earns a grade of B– or lower, they will be placed on academic probation. In order to return to nonprobationary status, the student must retake the course during the next semester in which it is offered and earn a B or better. Failure to do so or earning a B– or below in any remaining course will result in dismissal from the Master of Science in Applied Behavior Analysis program.

COURSE PROGRESSION

Students are expected to register for at least one course per academic term. In order to take a semester off (including the full summer semester), students must contact their faculty advisor to inform them of the timeline and apply for a leave of absence. Students who do not apply for a leave of absence prior to skipping a semester may need to reapply when returning to their coursework.

Program Requirements

Students must complete all core, experiential learning, and project-based courses to successfully complete the program.

Core Courses

Students enrolled in the program should pass Behavioral Concepts and Principles (CAEP 6326) and Ethics for Behavior Analysts (CAEP 6329) prior to registering for other courses unless otherwise advised.

Code	Title	Hours
CAEP 6326	Behavioral Concepts and Principles	3
CAEP 6327	Behavior Assessment	3
CAEP 6328	Single-Case Research Design	3
CAEP 6329	Ethics for Behavior Analysts	3
CAEP 6341	Behavioral Interventions	3
CAEP 6342	Consultation, Supervision, and Management	3
CAEP 6343	Radical Behaviorism and Verbal Behavior	3
CAEP 6344	Experimental Analysis of Behavior	3

Experiential Learning Course

Experiential learning courses require students to have a site at which they are able to complete behavior analytic projects. There are additional requirements for students wishing to accrue supervised fieldwork hours through these courses.

The semester prior to the onset of each of these classes, the director of supervision will connect with students to confirm arrangements of an adequate worksite to complete all required activities and meeting availability. It is the responsibility of the student to comply with all deadlines throughout this process, or they will not be permitted to enroll in the course.

A grade of Satisfactory (S) is required for the following:

Code	Title	Hours
CAEP 8412	Experiential Learning in Skill Acquisition	2
CAEP 8413	Experiential Learning in Behavioral Supervision	2

Project-Based Courses

The project-based courses are designed to be taken concurrently so that students are guided through completion of a scholarly project. Prior to enrolling in Systematic Inquiry in Behavior Analysis 1 (CAEP 7412 (<https://catalog.northeastern.edu/search/?P=CAEP%207412>)), students will work with faculty to plan for their project.

Code	Title	Hours
CAEP 7412	Systematic Inquiry in Behavior Analysis 1	1
CAEP 7413	Systematic Inquiry in Behavior Analysis 2	1

Optional Courses

Students may elect to take up to two intensive practicum courses to fulfill additional supervised fieldwork hours. In order to register for these classes, students must complete all preparation tasks the semester prior to enrollment.

These courses can be started during the student's second semester in the program. These courses may not be completed in the same term as experiential learning courses Experiential Learning in Skill Acquisition (CAEP 8412) and Experiential Learning in Behavioral Supervision (CAEP 8413).

Contact the director of supervision for additional information and preparation tasks.

Code	Title	Hours
CAEP 8417	Intensive Practicum in Applied Behavior Analysis 1	2
CAEP 8418	Intensive Practicum in Applied Behavior Analysis 2	2

Program Credit/GPA Requirements

30 total semester hours required

Grade of B or higher required in each course, unless otherwise indicated

Minimum 3.000 GPA required

Applied Educational Psychology, MS (Boston)

Within Northeastern University's MS in Applied Educational Psychology, students enroll in foundational courses in learning, human development, assessment, and diversity. Students also begin their practicum sequence with the pre-practicum, the purpose of which is to provide students with observational experiences and an early opportunity to learn about the school ecology. Following completion of the MS in Applied Educational Psychology, students in good academic standing will enter the CAGS in School Psychology program. Both the MS and CAGS are necessary to obtain licensure as a school psychologist.

Students who are interested in concurrently pursuing early intervention qualification should consider the Early Intervention Graduate Certificate (p. 813). Please see also the CAGS School Psychology (p. 853) program.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B or higher is required in all coursework.

Code	Title	Hours
Clinical/Applied		
CAEP 6201	Introduction to Assessment	3
CAEP 6350	Introduction to Cognitive Assessment	3
CAEP 6400	Prepracticum in School Psychology	1
Foundations		
CAEP 6202	Research, Evaluation, and Data Analysis (course being added as additional way to fulfill stats requirement)	3
or HLTH 5410	Introduction to Statistics in Health and Behavioral Science	
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6206	Learning Principles	3
CAEP 6218	Infant, Child, and Adolescent Development	3
CAEP 6247	Child and Adolescent Psychopathology	3
CAEP 6328	Single-Case Research Design	3
CAEP 6360	Consultation and Program Evaluation	3
CAEP 6365	Seminar in School Psychology	3

Program Credit/GPA Requirements

31 total semester hours required

Minimum 3.000 GPA required

Applied Psychology, MS (Boston)

The Master of Science in Applied Psychology program at Northeastern University is committed to providing evidence-based knowledge in applied psychology to students who seek entry into a PhD in Counseling Psychology program and to graduates of baccalaureate degrees in human services, psychology, health sciences, and related disciplines who desire quality advanced training in applied psychology. The program is 30 semester hours and is intended to be completed in two semesters. It does not meet licensing regulations for mental health counselors in the Commonwealth of Massachusetts.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CAEP 5877	Research Methods in Applied Psychology	3
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6260	Community Counseling Psychology	3
CAEP 6282	Ethics and Professional Development	3
HLTH 5410	Introduction to Statistics in Health and Behavioral Science	3

Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Child, Adolescent, and Family Psychology (p. 859)
- Prevention Science (p. 859)
- Elective (p. 859)s Option (p. 859)

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

CONCENTRATION IN CHILD, ADOLESCENT, AND FAMILY PSYCHOLOGY

Code	Title	Hours
Complete five of the following:		15
CAEP 5150	Early Intervention: Family Systems	
CAEP 5878	Pediatric Psychology	
CAEP 5879	Trauma and Mental Health	
CAEP 6218	Infant, Child, and Adolescent Development	
CAEP 6222	Human Sexuality	
CAEP 6247	Child and Adolescent Psychopathology	

CONCENTRATION IN PREVENTION SCIENCE

Code	Title	Hours
Complete five of the following:		15
CAEP 6100	Prevention and Intervention: Evidence-Based Practices	
CAEP 6110	Etiology-Psychopathology Across the Life Span	
CAEP 6220	Development Across the Life Span	
CAEP 6242	Psychopathology: Diagnosis and Treatment Planning	
CAEP 6342	Consultation, Supervision, and Management	
CAEP 6346	Behavior Change for Individuals and Communities	
PHTH 5540	Health Education and Program Planning	
PHTH 6204	Society, Behavior, and Health	

ELECTIVES OPTION

Code	Title	Hours
Complete five of the following (electives not on this list may be chosen with faculty advisor approval):		15
CAEP 5150	Early Intervention: Family Systems	

CAEP 5878	Pediatric Psychology
CAEP 5879	Trauma and Mental Health
CAEP 6100	Prevention and Intervention: Evidence-Based Practices
CAEP 6110	Etiology-Psychopathology Across the Life Span
CAEP 6218	Infant, Child, and Adolescent Development
CAEP 6220	Development Across the Life Span
CAEP 6222	Human Sexuality
CAEP 6242	Psychopathology: Diagnosis and Treatment Planning
CAEP 6247	Child and Adolescent Psychopathology
CAEP 6342	Consultation, Supervision, and Management
CAEP 6346	Behavior Change for Individuals and Communities
PHTH 5540	Health Education and Program Planning
PHTH 6204	Society, Behavior, and Health

Counseling Psychology, MSCP (Boston)

The Master of Science in Counseling Psychology program at Northeastern University is committed to the development of competent Licensed Mental Health Counselors (LMHC) through the disciplinary studies and contemporary professional practice of counseling psychology. The program complies with licensing regulations for mental health counselors in the Commonwealth of Massachusetts and is unique in its offer of a choice of specific specializations to gain additional depth in selected areas within the general Master of Science program.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/academics/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

The MSCP program requires a grade of B or better in all courses. Practicum and internship courses require a grade of Satisfactory (S). Grades of B– and lower or Unsatisfactory (U) are inconsistent with this policy. If received, students will be required to pay for the course again, repeat the course, and earn a grade of B or better or a grade of Satisfactory (S) in clinical practice courses.

Core Requirements

Code	Title	Hours
Seminar		
CAEP 6380	Seminar in Feminist Psychology	3
Required Core		
CAEP 6200	Introduction to Counseling: Theory and Process in an Ecological Context	3
CAEP 6201	Introduction to Assessment	3
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6220	Development Across the Life Span	3
CAEP 6235	Vocational, Education, and Career Development	3
CAEP 6242	Psychopathology: Diagnosis and Treatment Planning	3
CAEP 6250	Individual Interventions	3
CAEP 6260	Community Counseling Psychology	3
CAEP 6282	Ethics and Professional Development	3
CAEP 6287	Group Counseling	3
CAEP 6375	Substance Use and Treatment	3
CAEP 6399	Clinical Skills in Counseling Psychology	3
Research		
CAEP 6202	Research, Evaluation, and Data Analysis	3
Practicum		
CAEP 8401	Practicum in Counseling Psychology ¹	3
Internship		
CAEP 8510	Internship in Counseling Psychology 1	3
CAEP 8511	Internship in Counseling Psychology 2	3

¹ If a student enrolls in Practicum in Counseling Psychology (CAEP 8401) two times, the student may only choose 6 semester hours for electives.

In rare cases where the student has chosen a *concentration and enrolls in CAEP 8401 two times*, the successful completion of Practicum in Counseling Psychology (CAEP 8401) for the second time takes priority. The student then must either forgo the concentration to complete the program with 60 semester hours or may choose to enroll in an additional course to complete the program plus concentration for a total of 63 semester hours.

Concentrations or Electives Option

A concentration is not required. Students may complete electives option in lieu of a concentration.

- Child and Adolescent Counseling Concentration (p. 861)
- Early Intervention Concentration (p. 861)
- Research in Counseling Psychology Concentration (p. 861)
- Electives (p. 861)

Program Credit/GPA Requirements

A minimum of 60 total semester hours is required

Minimum 3.000 GPA required

CHILD AND ADOLESCENT COUNSELING CONCENTRATION

Code	Title	Hours
CAEP 6247	Child and Adolescent Psychopathology	3
CAEP 6401	Counseling Children and Adolescents in Schools	3
Complete one of the following:		3
CAEP 6218	Infant, Child, and Adolescent Development	
CAEP 6402	Promoting Social, Emotional, and Behavioral Success in Schools	
CAEP 6286	Family Counseling Interventions	

EARLY INTERVENTION CONCENTRATION

Students who would like to earn a certification in early intervention must complete two semesters of internship at an early intervention site.

Code	Title	Hours
Complete 9 semester hours from the following:		9
CAEP 5150	Early Intervention: Family Systems	
CAEP 5151	Early Intervention: Infant and Toddler Development, Risk, and Disability	
CAEP 5153	Early Intervention: Assessment and Intervention	
CAEP 6218	Infant, Child, and Adolescent Development	
SLPA 5152	Early Intervention: Planning and Evaluating Services	

RESEARCH IN COUNSELING PSYCHOLOGY CONCENTRATION

Code	Title	Hours
Complete 9 semester hours from the following:		9
CAEP 6328	Single-Case Research Design	
CAEP 7711	Measurement: Advanced Psychometric Principles	
CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CAEP 7716	Advanced Research and Data Analyses 2	
CAEP 7771	Research Team Experience	
HLTH 5410	Introduction to Statistics in Health and Behavioral Science	
PHTH 6320	Qualitative Methods in Health and Illness	

ELECTIVES OPTION

When students are required to complete Practicum in Counseling Psychology (CAEP 8401) two times, students may only choose 6 semester hours as electives. Electives not on this list may be chosen with faculty advisor approval.

Code	Title	Hours
Complete 9 semester hours from the following:		9
CAEP 6218	Infant, Child, and Adolescent Development	
CAEP 6222	Human Sexuality	
CAEP 6247	Child and Adolescent Psychopathology	

CAEP 6283	Brief Therapies
CAEP 6286	Family Counseling Interventions
CAEP 6390	History and Systems of Psychology
CAEP 6394	Advanced Multicultural Psychology
CAEP 7720	Advanced Clinical Interventions
CAEP 7758	Doctoral Seminar in Contemporary Theories of Psychotherapy
PHTH 6320	Qualitative Methods in Health and Illness

Early Intervention, Graduate Certificate (Boston)

Northeastern University's Certificate Program in Early Intervention is grounded in interdisciplinary experiential learning and, thus, designed to prepare students for careers working with babies, toddlers, and their family units.

The interdisciplinary nature of the program is enhanced through diversity of both student and instructor experiences. The program spans across several disciplines including school psychology, counseling psychology, and speech-language pathology. Undergraduate students in their final year of schooling and working professionals may also participate, which further enriches the constitution of each year's cohort.

The program is delivered in a fully online format. Classes meet synchronously one day each month, and additional course content is delivered online. This format allows for maximal participation in both classroom learning and experiential application.

This graduate certificate program can be completed by non-degree-seeking students or integrated with master's or doctoral degree programs. Application of coursework from certain degree programs will be approved to apply to requirements of this graduate certificate; students are encouraged to speak with their academic advisors early in their programs to explore these options.

The goals for the early intervention certificate program are to prepare personnel:

- To provide services to infants and toddlers with disabilities and their families from culturally and linguistically diverse backgrounds
- In achieving all early intervention competencies set forth by the Massachusetts DPH and those that are consistent with best practice and research
- In an interdisciplinary manner, drawing from Northeastern's multidisciplinary resources
- To function effectively across teams (individualized family service plan teams, community teams, interagency teams) and to understand the roles of their interdisciplinary and transdisciplinary co-clinicians

Upon graduation, students are eligible for employment in an early intervention service delivery setting.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in all courses.

Code	Title	Hours
Required Core		
Completing the courses below provides eligibility to pursue provisional certification in the state of Massachusetts upon employment in an early intervention setting. Consult with your program director to determine the availability of and recommended/required enrollment sequence for your respective program.		
CAEP 5150	Early Intervention: Family Systems	3
CAEP 5151	Early Intervention: Infant and Toddler Development, Risk, and Disability	3
CAEP 5153	Early Intervention: Assessment and Intervention	3
SLPA 5152	Early Intervention: Planning and Evaluating Services	3
Optional Practicum		
Completing the courses below provides eligibility to pursue provisional certification with advanced standing in the state of Massachusetts upon employment in an early intervention setting. Consult with your program director to determine eligibility for and availability of these course options.		
SLPA 5154	Early Intervention Practicum 1	
SLPA 5155	Early Intervention Practicum 2	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Personal Health Informatics, PhD (Boston)

Northeastern University's Doctor of Philosophy in Personal Health Informatics is a transdisciplinary doctoral program focused on educating top researchers in the theoretical underpinnings, design, evaluation, and dissemination of consumer- and patient-focused health systems. Personal health technologies are those that non-health professionals interact with *directly*, both in and out of a clinical setting and in various life stages of illness and wellness.

Examples include:

- Assistive technologies that aid persons with disabilities
- Consumer wellness promotion technologies
- Patient education and counseling systems
- Interfaces for reviewing personal health records
- Advanced ambulatory monitoring for supporting health
- Automated elder care systems that monitor health and support independent living
- Social networking systems connecting families and their social and medical support networks

Developing personal health interface technologies requires that professionals have skills and experience designing systems for individual patients and consumers with a wide range of backgrounds in different contexts using a variety of media, while ensuring that fielded technologies are effective, reliable, and responsive to the needs of at-risk and patient populations. Critical skills and knowledge include needs assessment, theories of interface design and health behavior, rapid prototyping and implementation, experimental design with human subjects in challenging settings, and statistical data analysis and validation. Moreover, these skills must be deployed while working with, or leading, transdisciplinary teams.

The interdisciplinary nature of the program targets students who are interested in improving health and wellness using novel technologies that directly impact the lives of consumers and patients. This is a program for students who are not only technically strong but also socially conscious, design oriented, and interested in rigorously evaluating the technologies they imagine and build. The program provides a path for technical students to acquire more experience in the deployment and evaluation of health technologies in the field but also a path for students with health backgrounds to develop the technical skills needed to prototype and assess creative ideas they envision for improving care. The expected length of study is five years after the bachelor's degree.

Admission Requirements

Students will be accepted with either of the following:

- A bachelor's or higher degree in a technical discipline (e.g., computer science or information science, computer systems engineering) with either academic or work experience demonstrating a commitment to working in health.
- A bachelor's or higher degree in a health science discipline (e.g., nursing, medicine, physical therapy, pharmacy, public health) with either some academic coursework in technology, such as a course in programming or design, or work experience where the applicant participated in the development, adaptation, or evaluation of consumer- or patient-facing health technology. (Otherwise outstanding applicants without programming skills may be advised to take an introductory programming course prior to entry; otherwise outstanding applicants without any formal experience working in health settings may be advised to spend some time volunteering in a medical or community health setting prior to entry.)

Applicants will be expected to have:

- A minimum 3.000 undergraduate GPA
- A minimum total GRE score of 300 or equivalent
- A minimum GRE academic writing score of 3.5
- For international applicants, a minimum TOEFL score of 105

Minimum Academic Standards and Requirements

RESIDENCY REQUIREMENT

The residency requirement will follow the university's residency requirement for PhD programs (<https://catalog.northeastern.edu/graduate/general-admission-transfer-credit/regulations-phd-programs/>).

TEACHING REQUIREMENT

All personal health informatics PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment, or quiz, or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

DISSERTATION ADVISING

Each student will have one primary advisor from the personal health informatics doctoral program faculty.

DISSERTATION COMMITTEE

The committee will consist of at least three members: the dissertation advisor, one additional personal health informatics doctoral program faculty member, and one member external to Northeastern who is an expert in the specific personal health informatics topic of research. The dissertation committee shall include experts with both health and technology backgrounds. The dissertation advisor must be a full-time member of the Northeastern faculty.

QUALIFYING EXAMINATION

The qualifying examination consists of a three-part exam conducted by a committee of three personal health informatics doctoral program faculty members, each overseeing one part of the exam. The research core of the exam is fulfilled with submission of a high-quality paper to a strong peer-reviewed conference or journal. The health component of the exam is fulfilled when the student passes a written exam developed by a faculty member with a health sciences background, and the technical component of the exam is fulfilled when the student passes an exam developed by a faculty member with a technical background. The content of the written exams and the paper topic are developed in consultation with each faculty member.

DEGREE CANDIDACY

A student is considered a PhD degree candidate upon meeting these conditions:

- Completion of core courses with a minimum GPA of 3.000 overall on the core courses
- Completion of the qualifying examination

COMPREHENSIVE EXAM

A PhD student must submit a written dissertation proposal to the dissertation committee. The proposal should identify the research problem, the research plan, and its potential impact on the field. A presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee.

DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in personal health informatics.

Curriculum Requirements**REQUIRED AND ELECTIVE COURSES**

The curriculum is designed to provide all PhD students with a strong foundation in principles critical to the design and evaluation of personal health interfaces. All students take six core courses (24 semester hours) and the user-interface practicum (1 semester hour). The student must maintain a minimum GPA of 3.500 among the six core courses and receive a grade of B or better in each of these courses. All students must also fulfill the programming fundamentals requirement (4 semester hours) and the statistics fundamentals requirement (4 semester hours), where some flexibility in course selection allows tailoring based on background and experience. Two additional research electives (8 semester hours) are selected based on research interests from the personal health informatics electives list. Students are also expected to participate in the personal health informatics seminar series during semesters when it is run.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Annual review
Dissertation proposal
Dissertation committee
Dissertation defense

Core Requirements

A grade of B or higher is required in each course. A cumulative 3.500 grade-point average is required for the core requirement.

Code	Title	Hours
Foundations		
HINF 5200	Theoretical Foundations in Personal Health Informatics	4
Program Design and Development		
CS 5010	Programming Design Paradigm (or another programming course)	4
CS 7340	Theory and Methods in Human Computer Interaction	4
HINF 5300	Personal Health Interface Design and Development	4
Methods and Statistics		
CS 7300	Empirical Research Methods for Human Computer Interaction	4
Complete one of the following:		3-4
CAEP 7712	Intermediate Statistical Data Analysis Techniques	

CS 7200	Statistical Methods for Computer Science	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
Evaluation		
HINF 5301	Evaluating Health Technologies	4
HINF 8982	Readings	1-8

Electives

Code	Title	Hours
Complete 12–17 semester hours in the following subject areas to fulfill the minimum program hours (see faculty advisor for other acceptable elective courses):		
CAEP		
CS		
HINF		
HLTH		
PHTH		

Dissertation

Code	Title	Hours
HINF 9990	Dissertation Term 1	
HINF 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Sample Plan of Study

Code	Title	Hours
Year 1		
<i>Fall Semester</i>		
CS 7340	Theory and Methods in Human Computer Interaction	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
<i>Spring Semester</i>		
CS 5010 or CS 5520	Programming Design Paradigm Mobile Application Development	
CS 7300	Empirical Research Methods for Human Computer Interaction	
Year 2		
<i>Fall Semester</i>		
HINF 5300	Personal Health Interface Design and Development	
PHTH 5210 or PHTH 6440 or CAEP 7712 or CS 7200	Biostatistics in Public Health Advanced Methods in Biostatistics Intermediate Statistical Data Analysis Techniques Statistical Methods for Computer Science	
<i>Spring Semester</i>		
HINF 5301	Evaluating Health Technologies	
Personal health informatics electives		
Year 3		
<i>Fall Semester</i>		
HINF 9990	Dissertation Term 1	
HINF 8982	Readings	
<i>Spring Semester</i>		
HINF 9991	Dissertation Term 2	
Personal health informatics electives		
Year 4		

Fall Semester

HINF 9996	Dissertation Continuation

Spring Semester

HINF 9996	Dissertation Continuation

Year 5*Fall Semester*

HINF 9996	Dissertation Continuation

Spring Semester

HINF 9996	Dissertation Continuation

Population Health, PhD (Boston)

This program seeks to train students to become public health researchers and leaders through simultaneous examination of multiple determinations of health, including social, environmental, nutritional, and behavioral risk factors. Our students investigate the underlying causes of adverse health, including disease, disparities, and disability, through training in core population health disciplines—biostatistics, epidemiology, and health services—together with individual-specific and specialized training in topics related to student research. Importantly, our students are mentored by Northeastern's distinguished faculty, who individually and together conduct innovative, solution-focused research in critical population health topics.

Our population health doctoral students have an opportunity to learn to conduct research that addresses five key health determinants:

1. Social and community contexts
2. Environment and neighborhoods
3. Health and healthcare delivery
4. Education
5. Economic stability

Our diverse faculty has expertise in numerous population health disciplines, including health services research, health disparities, environmental and social epidemiology, biostatistics, exercise science, medical sociology, public policy, personal health technologies, and mental health. Students have the opportunity to work side by side with faculty in conducting cutting-edge, transdisciplinary research in these fields.

Course Requirements

All population health PhD candidates must earn at least 33 semester hours by completing core research courses, selecting a concentration and taking courses for that concentration, and taking additional electives and directed study courses as needed and in consultation with their faculty advisors. They must complete a dissertation in order to earn their degree. Eight core courses (22–23 semester hours) must be taken by all students, in addition to a mandatory, non-credit-bearing seminar speaker series. All students must fulfill the requirements of their specific population health option: social and environmental determinants of health or health services and policy. There may be some flexibility in course selection based on a student's relevant experience and dissertation topic. Students must consult with their advisor before selecting elective courses (9–10 semester hours). Electives should be used to either help the student develop skills needed for research or to help the student develop new research ideas.

ADVANCED ENTRY

This program is strictly for students who already have a master's degree in public health or a closely related area and have full-time employment at a company or agency who has entered into an agreement with Northeastern to be the student's sponsor. Completion of the PhD program requires 21–23 semester hours, including a yearlong research methods seminar and other advanced research courses. All students must fulfill the course requirements of their specific population health option: social and environmental determinants of health (9 semester hours) or health services and policy (7 semester hours). There may be some flexibility in course selection based on a student's relevant experience and dissertation topic. Students must consult with their advisor before selecting elective courses. Electives can be used to either help the student develop skills needed for research or to help the student develop new research ideas but are not required.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/academics/learning-outcomes/>) for the specific student learning outcomes for this program.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Population Health (<https://catalog.northeastern.edu/graduate/health-sciences/community-health-behavioral-sciences/population-health-ms/>) degree. Note that no students will be admitted directly into the Population Health program to pursue a master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Annual review
Dissertation committee
Dissertation proposal
Oral defense of dissertation proposal
Candidacy status
Dissertation defense

Core Requirements

Code	Title	Hours
Health Services		
PHTH 5232 or PHTH 5234	Evaluating Healthcare Quality Economic Perspectives on Health Policy	3
Population Health		
PHTH 6400	Principles of Population Health 1	3
PHTH 6410	Principles of Population Health 2	3
Epidemiology		
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3
Research Ethics		
BIOL 6381 or PHSC 5212	Ethics in Biological Research Research Skills and Ethics	2
Research and Analysis		
PHTH 5210	Biostatistics in Public Health	3
PHTH 6210	Applied Regression Analysis	3

Options

Complete one of the following options:

SOCIAL AND ENVIRONMENTAL DETERMINANTS OF HEALTH OPTION

Code	Title	Hours
PHTH 6224	Social Epidemiology	3
PHTH 6440	Advanced Methods in Biostatistics	3
PHTH 6800	Causal Inference in Public Health Research	3
Electives		2-4

HEALTH SERVICES AND POLICY OPTION

Code	Title	Hours
ECON 5110	Microeconomic Theory	4
PHTH 5234	Economic Perspectives on Health Policy	3
Electives		3-4

Electives

Code	Title	Hours
CS 6220	Data Mining Techniques	
CS 7280	Special Topics in Database Management	
ECON 5110	Microeconomic Theory	
ECON 5140	Applied Econometrics	
ECON 7200	Topics in Applied Economics	
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5220	Advanced Exercise Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HRMG 6220	Health Organization Management	
PHSC 6216	Human Physiology and Pathophysiology	
PHTH 5212	Public Health Administration and Policy	

PHTH 5214	Environmental Health
PHTH 5226	Management and Leadership in Public Health and Healthcare
PHTH 5230	Global Health
PHTH 5540	Health Education and Program Planning
PHTH 6200	Principles and History of Urban Health
PHTH 6204	Society, Behavior, and Health
PHTH 6208	Foundations of Community Health Assessment
PHTH 6320	Qualitative Methods in Health and Illness
STRT 6220	Strategic Management for Healthcare Organizations

Dissertation

Code	Title	Hours
PHTH 9990	Dissertation Term 1	
PHTH 9991	Dissertation Term 2	

Program Credit/GPA Requirements

33 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination

Annual review

Dissertation committee

Dissertation proposal

Oral defense of dissertation proposal

Candidacy Status

Dissertation defense

Core Requirements

A grade of B or higher is required in all coursework. Students must complete all core requirements unless otherwise indicated:

Code	Title	Hours
Population Health		
PHTH 6400	Principles of Population Health 1	3
PHTH 6410	Principles of Population Health 2	3
Epidemiology		
PHTH 6202	Intermediate Epidemiology	3
Research Ethics		
BIOL 6381	Ethics in Biological Research	2
or PHSC 5212	Research Skills and Ethics	
Research and Analysis		
PHTH 6210	Applied Regression Analysis	3

Options

Complete one of the following options:

- Social and Environmental Determinants of Health Option
- Health Services and Policy Option

SOCIAL AND ENVIRONMENTAL DETERMINANTS OF HEALTH OPTION

Code	Title	Hours
PHTH 6224	Social Epidemiology	3
PHTH 6440	Advanced Methods in Biostatistics	3
PHTH 6800	Causal Inference in Public Health Research	3

HEALTH SERVICES AND POLICY OPTION

Code	Title	Hours
ECON 5110	Microeconomic Theory	4
PHTH 5234	Economic Perspectives on Health Policy	3

Electives

Students may elect to take additional course credits to support their dissertation work.

Code	Title	Hours
CS 6220	Data Mining Techniques	
CS 7280	Special Topics in Database Management	
ECON 5140	Applied Econometrics	
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5220	Advanced Exercise Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HRMG 6220	Health Organization Management	
PHSC 6216	Human Physiology and Pathophysiology	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	
PHTH 5226	Management and Leadership in Public Health and Healthcare	
PHTH 5230	Global Health	
PHTH 5540	Health Education and Program Planning	
PHTH 6200	Principles and History of Urban Health	
PHTH 6204	Society, Behavior, and Health	
PHTH 6208	Foundations of Community Health Assessment	
PHTH 6320	Qualitative Methods in Health and Illness	
STRT 6220	Strategic Management for Healthcare Organizations	

Dissertation

Code	Title	Hours
PHTH 9990	Dissertation Term 1	
PHTH 9991	Dissertation Term 2	

Program Credit/GPA Requirements

Minimum 21 total semester hours required

Minimum 3.000 GPA required

Public Health, MPH (Boston)

Through innovation in experiential education, research, and service, the Master of Public Health at Northeastern University (<https://bouve.northeastern.edu/health-sciences/programs/master-public-health/>) trains diverse and skilled professionals who promote and protect the health of all communities. This program is accredited by the Council on Education for Public Health (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

MPH—Traditional

In order to help prepare the next generation of public health leaders and professionals, the MPH offers our diverse graduate students an opportunity to:

- Participate in learning options that meet the needs of the working professional:
 - On-ground, courses are offered in the evening (most classes meet once a week in the evening).
 - Enroll as either a full-time or part-time student.
 - Complete your degree online, on-ground, or in a hybrid format (a combination of both on-ground and online courses).
- Take 9 semester hours of elective coursework in emerging, relevant areas in the field—including public mental health and public health technologies—or choose electives from a wide range of topics including cross-departmental offerings from Northeastern's other colleges (law, business, social sciences, and more).
- Enjoy a supportive learning environment that includes outstanding student mentoring.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Traditional Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B– or higher is required in each required course.

Code	Title	Hours
Public Health Core		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5540	Health Education and Program Planning	3
PHTH 6204	Society, Behavior, and Health	3
Social Determinants of Health Core		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Foundations of Community Health Assessment	3
Experiential Core		
PHTH 6910	Public Health Capstone	3
PHTH 6966	Practicum	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following (in consultation with your academic advisor, you may complete electives from another discipline):		9
HLTH 5800	AI Across the Health Sciences ¹	
PHTH 5222	Health Advocacy	
PHTH 5226	Management and Leadership in Public Health and Healthcare	
PHTH 5230	Global Health	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
PHTH 5300	Project Management in Public Health	
PHTH 5310	Budget Principles in Public Health	
PHTH 5320	Grant Writing in Public Health	
PHTH 5350	Using SAS in Public Health Research	
PHTH 5540	Health Education and Program Planning	
PHTH 6202	Intermediate Epidemiology	
PHTH 6210	Applied Regression Analysis	
PHTH 6224	Social Epidemiology	
PHTH 6320	Qualitative Methods in Health and Illness	
PHTH 6400	Principles of Population Health 1	
PHTH 6410	Principles of Population Health 2	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6800	Causal Inference in Public Health Research	
PPUA 6509	Techniques of Program Evaluation	
Public Health Technologies		
HINF 5102	Data Management in Healthcare	
HINF 6400	Introduction to Health Data Analytics	
PHTH 6130	Public Health Technologies: Ethics and Equity	
Public Mental Health		
CAEP 6100	Prevention and Intervention: Evidence-Based Practices	

CAEP 6110	Etiology-Psychopathology Across the Life Span
CAEP 6220	Development Across the Life Span

¹ AI Across the Health Sciences (HLTH 5800) is a 4-semester-hour course.

Program Credit/GPA Requirements

42 total semester hours required

Minimum 3.000 GPA required

Public Health, MPH (Charlotte)

Through innovation in experiential education, research, and service, the Master of Public Health at Northeastern University (<https://bouve.northeastern.edu/health-sciences/programs/master-public-health/>) trains diverse and skilled professionals who promote and protect the health of all communities. This program is accredited by the Council on Education for Public Health (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

MPH—Charlotte

In order to help prepare the next generation of public health leaders and professionals, the MPH offers our diverse graduate students an opportunity to:

- Participate in learning options that meet the needs of the working professional:
 - Enroll as either a full-time or part-time student
 - Complete your degree using online asynchronous courses
 - Charlotte MPH students participate in a one-week in-person course residency at the Center for Health Sciences at Northeastern's Charlotte, North Carolina, campus
- Take 9 semester hours of elective coursework in emerging, relevant areas in the field, including public mental health and public health technologies, or choose electives from a wide range of topics, including cross-departmental offerings from Northeastern's other colleges (law, business, social sciences, and more)
- Enjoy a supportive learning environment that includes outstanding student mentoring

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B– or higher is required in each course.

Code	Title	Hours
Public Health Core		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5540	Health Education and Program Planning	3
PHTH 6204	Society, Behavior, and Health	3
Social Determinants of Health Core		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Foundations of Community Health Assessment	3
Experiential Core		
PHTH 6910	Public Health Capstone	3
PHTH 6966	Practicum	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following (in consultation with your academic advisor, you may complete electives from another discipline):		9

HLTH 5800	AI Across the Health Sciences ¹
PHTH 5222	Health Advocacy
PHTH 5226	Management and Leadership in Public Health and Healthcare
PHTH 5300	Project Management in Public Health
PHTH 5310	Budget Principles in Public Health
PHTH 5320	Grant Writing in Public Health
<i>Public Health Technologies</i>	
HINF 5102	Data Management in Healthcare
HINF 6400	Introduction to Health Data Analytics
PHTH 6130	Public Health Technologies: Ethics and Equity
<i>Public Mental Health</i>	
CAEP 6100	Prevention and Intervention: Evidence-Based Practices
CAEP 6110	Etiology-Psychopathology Across the Life Span
CAEP 6220	Development Across the Life Span

¹ AI Across the Health Sciences (HLTH 5800) is a 4-semester-hour course.

Program Credit/GPA Requirements

42 total semester hours required

Minimum 3.000 GPA required

Public Health, MPH—Accelerated (Boston)

Through innovation in experiential education, research, and service, the Master of Public Health at Northeastern University (<https://bouve.northeastern.edu/health-sciences/programs/master-public-health/>) trains diverse and skilled professionals who promote and protect the health of all communities. This program is accredited by the Council on Education for Public Health (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

MPH—One-Year Accelerated

The One-Year Accelerated MPH pathway allows students to complete all degree components in 12 months with an emphasis on public health practice and experiential learning. This is a full-time, asynchronous online program that offers an opportunity to:

- Take 9 semester hours of elective coursework from a wide range of practical, public health topics including cross-departmental offerings
- Fulfill experiential coursework
- Enjoy a supportive learning environment that includes outstanding student mentoring

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B– or higher is required in each required course.

Code	Title	Hours
Public Health Core		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5540	Health Education and Program Planning	3
PHTH 6204	Society, Behavior, and Health	3
Social Determinants of Health Core		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Foundations of Community Health Assessment	3
Experiential		

PHTH 6910	Public Health Capstone	3
PHTH 6966	Practicum	3

Electives

Code	Title	Hours
Complete 9 semester hours from the following (in consultation with your academic advisor, you may complete electives from another discipline):		9
HLTH 5800	AI Across the Health Sciences ¹	
PHTH 5222	Health Advocacy	
PHTH 5226	Management and Leadership in Public Health and Healthcare	
PHTH 5300	Project Management in Public Health	
PHTH 5310	Budget Principles in Public Health	
PHTH 5320	Grant Writing in Public Health	
Public Health Technologies		
HINF 5102	Data Management in Healthcare	
HINF 6400	Introduction to Health Data Analytics	
PHTH 6130	Public Health Technologies: Ethics and Equity	
Public Mental Health		
CAEP 6100	Prevention and Intervention: Evidence-Based Practices	
CAEP 6110	Etiology-Psychopathology Across the Life Span	
CAEP 6220	Development Across the Life Span	

¹ AI Across the Health Sciences (HLTH 5800) is a 4 credit course.

Program Credit/GPA Requirements

42 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Year 1									
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Summer Full Semester	Hours
Fall A		Spring A		PHTH 5540		3 PHTH 5300		1 PHTH 6910	3
PHTH 6200		3 PHTH 5212		3 PHTH 5226		3 PHTH 5310		1	
PHTH 6208		3 PHTH 5120		3		PHTH 5320		1	
Fall B		Spring B							
PHTH 5222		3 PHTH 5214		3					
PHTH 6204		3 Full Spring							
Full Fall		PHTH 5202		3					
PHTH 5210		3 PHTH 6966		3					
		15		15		6		3	3

Total Hours: 42

Complex Network Analysis, MS (Boston)

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master's degree program in complex network analysis methodologies. The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business
4. Biological systems modeling used across research and industry including network biology, drug discovery, or multi-omics mining

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Biological Networks—College of Science
- Complex Social Systems—College of Social Sciences and Humanities
- Economic and Technological Networks—Khoury College of Computer Sciences
- Population Health Dynamics—Bouv  College of Health Sciences

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CNET 5050	Fundamentals of Complex Networks	4
CNET 5051	Analyzing Complex Network Data	4
CNET 5052	Advanced Tools for Complex Network Analysis	4
CNET 5901	Visualizing Complex Networks	2
CNET 5902	Communicating Network Data	2

Concentrations

Complete one of the following concentrations:

- Complex Biological Networks (p. 167)—College of Science
- Complex Social Systems (p. 168)—College of Social Sciences and Humanities
- Economic and Technological Networks (p. 168)—Khoury College of Computer Sciences
- Population Health Dynamics (p. 169)—Bouv  College of Health Sciences

Experiential Courses

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		4
CNET 6107	Complex Network Analysis Research Rotation	
CNET 6108	Complex Network Analysis Capstone	
CNET 6990	Thesis	

Optional Co-op

Code	Title	Hours
CNET 6000	Professional Development for Co-op	1
CNET 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

Minimum 33 total semester hours required

Additional hours may be required based on student choice of courses or concentration.

One semester hour of additional coursework is required for participation in co-op.

Minimum 3.000 GPA required

CONCENTRATION IN COMPLEX BIOLOGICAL NETWORKS—COLLEGE OF SCIENCE

Code	Title	Hours
A minimum of 16 semester hours is required to complete this concentration.		
Required		

CNET 5515	Complex Network Analysis for Biological Systems	4
Complete 8 semester hours from the following:		8
BINF 6308	Bioinformatics Computational Methods 1	
BINF 6310	Introduction to Bioinformatics	
EEMB 5130	Population Dynamics	
ENVR 5450	Applied Social-Ecological Systems Modeling	
MATH 5131	Introduction to Mathematical Methods and Modeling	
MATH 7340	Statistics for Bioinformatics	
PHYS 5211	Introduction to Scientific Computing	
Complete 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5314	Complexity in Social Systems	
CNET 5411	Financial and Economic Networks	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN COMPLEX SOCIAL SYSTEMS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
A minimum of 13 semester hours is required to complete this concentration.		
Required		
CNET 5314	Complexity in Social Systems	3
Complete a minimum of 6 semester hours from the following:		6
CNET 5311	Physical and Digital Human Traces	
CNET 5360	Research Design for Social Networks	
INSH 5301	Introduction to Computational Statistics	
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	
INSH 6300	Research Methods in the Social Sciences	
INSH 6304	Modeling and Analyzing Social Networks	
INSH 6406	Analyzing Complex Digitized Data	
INSH 6500	Statistical Analysis	
PHYS 5211	Introduction to Scientific Computing	
PPUA 5262	Big Data for Cities	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5411	Financial and Economic Networks	
CNET 5515	Complex Network Analysis for Biological Systems	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN ECONOMIC AND TECHNOLOGICAL NETWORKS—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
A minimum of 14 semester hours is required to complete this concentration.		
Required		
CNET 5411	Financial and Economic Networks	3
Complete a minimum of 7 semester hours from the following:		7
CS 7150	Deep Learning	
CS 7200	Statistical Methods for Computer Science	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
MISM 6212	Data Mining and Machine Learning for Business	

PHYS 5211	Introduction to Scientific Computing	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5314	Complexity in Social Systems	
CNET 5515	Complex Network Analysis for Biological Systems	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN POPULATION HEALTH DYNAMICS—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
A minimum of 14 semester hours is required to complete this concentration.		
Required		
CNET 5126	Spreading on Networks: From Epidemics to Memes	4
Complete a minimum of 6 semester hours from the following:		6
BINF 6308	Bioinformatics Computational Methods 1	
PHTH 5210	Biostatistics in Public Health	
PHTH 6210	Applied Regression Analysis	
PHTH 6224	Social Epidemiology	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6800	Causal Inference in Public Health Research	
PHTH 6801	Causal Inference 1	
PHYS 5211	Introduction to Scientific Computing	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5314	Complexity in Social Systems	
CNET 5411	Financial and Economic Networks	
CNET 5515	Complex Network Analysis for Biological Systems	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

Health Data Analytics, MS—Online

The digitization of healthcare systems in clinical settings, in combination with the explosion of personal data collection devices, creates opportunities for using data to revolutionize approaches to health at all levels. The Master of Science in Health Data Analytics prepares students to make an impact on health outcomes, medical knowledge, and healthcare systems by producing data-driven insights.

The fully online and asynchronous Master of Science in Health Data Analytics is intended for students that seek to build analytics skills required to stand out in the healthcare industry. This program is designed for learners from multiple backgrounds and will prepare students with the specific technical skills required to excel in analytical roles in healthcare. Graduates will gain the expertise to extract actionable insights, identify patterns and trends, and inform evidence-based decision making in the dynamic healthcare landscape.

The program combines a robust analytics core presenting fundamental concepts such as data acquisition, data mining, statistics, and data visualization with foundational knowledge for navigating the healthcare data system. Health analytics courses discuss the complex data and information needs throughout the healthcare ecosystem including the needs of payers, providers, and regulatory agencies. Courses on health science as well as courses on the evolving business of healthcare provide students with deep, relevant industry knowledge preparing them for a variety of roles in the space. Students can expect to gain a broad and deep understanding of the various methods, software tools, and topical expertise needed to discover meaningful patterns in health-related data and effectively communicate their implications to a number of diverse stakeholders. In addition to the analytics core and the healthcare core, students will take elective courses allowing them to explore emerging topics of interest in more depth.

Successful graduates of the Master of Science in Health Data Analytics will be effective practitioners and leaders in the rapidly evolving domain of data analytics with a focus on health and healthcare.

Learning Outcomes

- Analyze organizational and stakeholder challenges in healthcare settings and develop data-driven solutions to address those challenges, align with strategic goals, and improve patient outcomes

- Collect health-related data from various sources, ensuring its accuracy and integrity
- Analyze health data using statistical, epidemiological, and data-mining methods, leveraging software tools and programming languages such as R, SAS, or Python to derive actionable insights
- Interpret and visualize analytical results by transforming complex data into clear charts and graphs that convey key insights to nontechnical stakeholders
- Present findings to nontechnical stakeholders by delivering concise, engaging narratives that highlight the implications of the analysis in an easily understandable format

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
DADS 6400	Foundations for Data Analytics	4
DADS 6600	Computation and Visualization for Analytics	4
DADS 7275	Machine Learning and Data Analytics	4
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
HINF 6355	Interoperability Key Standards in Health Informatics	3
HINF 6400	Introduction to Health Data Analytics	3
HSCI 5130	Introduction to Real-World Evidence	2

Electives

Code	Title	Hours
Complete 6 semester hours from the following:		6
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6404	Patient Engagement Informatics and Analytics	
PTH 5210	Biostatistics in Public Health	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Health Informatics, MS (Boston)

Northeastern University's interdisciplinary Master of Science in Health Informatics was the first MS in the field and is now one of the few that is fully interdisciplinary between health science and computer science.

The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Students may opt to select a concentration to deepen their knowledge in a particular area. Successful students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, information technology professionals, and patients.

Please visit Bouvé College Learning Outcomes (<http://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B– or higher is required in each course.

Core Requirements

Code	Title	Hours
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
Choose one of the following courses in consultation with your advisor:		
HINF 5105 or HINF 5106	The American Healthcare System The Canadian Healthcare System	3

Program Options

Choose one of the following options:

- Health Informatics (Without Concentration) (p. 448)
- Health Informatics with Health Informatics Analytics Concentration (p. 449)
- Health Informatics with Personal Health Informatics Concentration (p. 449)

Program Credit/GPA Requirements

Minimum 33 total semester hours required

Minimum 3.000 GPA required

HEALTH INFORMATICS (WITHOUT CONCENTRATION)

Code	Title	Hours
Required Coursework in Addition to Core Requirements		
Business Management		
Complete two of the following:		6
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	
or EMGT 5220	Engineering Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Management and Leadership in Public Health and Healthcare	
Health Informatics		
Complete two of the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 5301	Evaluating Health Technologies	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PHTH 5232	Evaluating Healthcare Quality	
Technical		
Complete two of the following:		6
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	
HINF 6400	Introduction to Health Data Analytics	
HLTH 5800	AI Across the Health Sciences	
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6210	Applied Regression Analysis	
PHTH 6400	Principles of Population Health 1	
PHTH 6440	Advanced Methods in Biostatistics	
One course from the following may count toward the technical core requirement:		
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
Capstone		
HINF 7701	Health Informatics Capstone Project	3

Electives

Complete two of the following:		6
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
HINF 6345	Design for Usability in Healthcare	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
PHIL 5110	Responsible AI	

HEALTH INFORMATICS ANALYTICS CONCENTRATION

Code	Title	Hours
Required Coursework in Addition to Core Requirements		

Business Management

Complete two of the following:		6
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215 or EMGT 5220	Project Management Engineering Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Management and Leadership in Public Health and Healthcare	

Health Informatics

Complete two of the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 5301	Evaluating Health Technologies	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PHTH 5232	Evaluating Healthcare Quality	

Technical

IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4

Capstone

HINF 7701	Health Informatics Capstone Project	3

Elective

Complete one of the following:		4
IE 5137	Computational Modeling in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5640	Data Mining for Engineering Applications	
IE 6600	Computation and Visualization for Analytics	
IE 6700	Data Management for Analytics	
IE 7275	Data Mining in Engineering	

PERSONAL HEALTH INFORMATICS CONCENTRATION

Code	Title	Hours
Required Coursework in Addition to Core Requirements		

Health Informatics

HINF 6205	Creation and Application of Medical Knowledge	3

Technical

CS 5340	Computer/Human Interaction	4

Complete one of the following. Students must petition to take electives outside the approved list:		4
CS 5010	Programming Design Paradigm	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 6200	Information Retrieval	
Complete one of the following:		3
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	
<i>Theory and Evaluation</i>		
PHTH 5210	Biostatistics in Public Health ¹	3
Complete one of the following:		4
CS 6350	Empirical Research Methods (On campus only)	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
Culminating Experience		
Complete one of the two options below.		6
<i>Thesis Option</i>		
Students must enroll in HINF 7990 for two semesters for a total of 6 semester hours with director approval only and under supervision of Personal Health Informatics faculty:		
HINF 7990	Thesis	
<i>Capstone Option</i>		
HINF 7701	Health Informatics Capstone Project	
Complete any course for a minimum of 3 semester from the Health Informatics (without concentration) curriculum, that has not been used in previous requirements.		

¹ Student may petition director to take a more advanced stats course, such as Applied Regression Analysis (PHTH 6210).

Health Informatics, MS (Vancouver)

Northeastern University's interdisciplinary Master of Science in Health Informatics was the first MS in the field and is now one of the few that is fully interdisciplinary between health science and computer science.

The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, information technology professionals, and patients.

Please visit Bouvé College Learning Outcomes (<http://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Note: For the 2025–2026 academic year, this program will be offered in an online format. If you have questions about eligibility, please reach out to your admissions counselor.

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B– or higher is required in each course.

Code	Title	Hours
Core Requirements		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5106	The Canadian Healthcare System	3
Business Management		
Complete two of the following:		6
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215	Project Management	

or EMGT 5220	Engineering Project Management	
HINF 6240	Improving the Patient Experience through Informatics	
HINF 6335	Management Issues in Healthcare Information Technology	
PHTH 5226	Management and Leadership in Public Health and Healthcare	
Health Informatics		
Complete two of the following:		6
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 5301	Evaluating Health Technologies	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PHTH 5232	Evaluating Healthcare Quality	
Technical		
Complete two of the following:		6
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	
HINF 6400	Introduction to Health Data Analytics	
HLTH 5800	AI Across the Health Sciences	
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6210	Applied Regression Analysis	
PHTH 6400	Principles of Population Health 1	
PHTH 6440	Advanced Methods in Biostatistics	
One course from the following may count toward the technical core requirement:		
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
PHIL 5110	Responsible AI	
Capstone		
HINF 7701	Health Informatics Capstone Project	3
Electives		
Complete two of the following:		6
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
HINF 6345	Design for Usability in Healthcare	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	

Program Credit/GPA Requirements

Minimum 33 total semester hours required

Minimum 3.000 GPA required

Statistics, MS (Boston)

The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The Master of Science in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across

domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouv  College of Health Sciences
- Statistical machine learning—Khoury College of Computer Sciences
- Statistical theory and modeling—College of Science

Students will follow all policies associated with their home college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 188)—Bouv  College of Health Sciences
- Statistical Machine Learning (p. 188)—Khoury College of Computer Sciences
- Statistical Theory and Modeling (p. 188)—College of Science

Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses may be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

Program Credit/GPA Requirements

31 total semester hours required (32 for students who declare the Concentration in Statistical Theory and Modeling and also opt to participate in co-op)

Minimum 3.000 GPA required

CONCENTRATION IN BIOSTATISTICS (BOUV  COLLEGE OF HEALTH SCIENCES)

Code	Title	Hours
Complete 12 semester hours from the following:		12
PHTH 5350	Using SAS in Public Health Research	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	
Optional Co-op		
HLTH 6964	Co-op Work Experience	0

CONCENTRATION IN STATISTICAL MACHINE LEARNING (KHOURY COLLEGE OF COMPUTER SCIENCES)

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Essentials of Data Science	4
Optional Co-op		
CS 6964	Co-op Work Experience	0

CONCENTRATION IN STATISTICAL THEORY AND MODELING (COLLEGE OF SCIENCE)

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
Optional Co-op		
EESC 6500	Pathways to Professional Success	1
EESC 6964	Co-op Work Experience	0

Statistics, MS—Connect (Boston)

The Master of Science in Statistics—Connect program is designed for students from all backgrounds with a BS/BA degree, provided the student has experience with basic calculus and statistics. The first semester of the degree program provides students with the foundational knowledge needed to study successfully alongside direct-entry graduate students. The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The MS in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical Machine Learning—Khoury College of Computer Sciences
- Statistical Theory and Modeling—College of Science

Students will follow all policies associated with their college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Connect Courses

Code	Title	Hours
Students are required to complete 8–10 semester hours from the following unless otherwise determined by the program:		
CS 5001	Intensive Foundations of Computer Science	
MATH 5001	Accelerated Linear Algebra	
MATH 5002	Accelerated Multivariable Calculus	
MATH 5003	Accelerated Probability and Statistics	
MATH 5110	Applied Linear Algebra and Matrix Analysis	

Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800	Causal Inference in Public Health Research	3-4
or PHTH 6801	Causal Inference 1	
PHTH 6830	Generalized Linear Models	4

Concentrations

Complete one of the following concentrations:

- Biostatistics—Bouv  College of Health Sciences (p. 190)
- Statistical Machine Learning—Khoury College of Computer Sciences (p. 190)
- Statistical Theory and Modeling—College of Science (p. 190)

Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses can be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

Program Credit/GPA Requirements

39-41 total semester hours required (40-42 for students who declare the Concentration in Statistical Theory and Modeling and also opt to participate in co-op)

Minimum 3.000 GPA required

BIostatistics Concentration—Bouv  College of Health Sciences

Code	Title	Hours
Complete 12 semester hours from the following:		12
PHTH 5350	Using SAS in Public Health Research	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	
Optional Co-op		
HLTH 6964	Co-op Work Experience	0

Statistical Machine Learning Concentration—Khoury College of Computer Sciences

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Essentials of Data Science	4
Optional Co-op		
CS 6964	Co-op Work Experience	0

Statistical Theory and Modeling Concentration—College of Science

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

Optional Co-op

EESC 6500	Pathways to Professional Success	1
EESC 6964	Co-op Work Experience	0

Law, JD / Public Health, MPH (Boston)

Northeastern University's School of Law and Bouvé College of Health Sciences offer a JD/MPH dual degree. Given the worldwide trend toward urbanization, the Master of Public Health (MPH) recognizes the growing need for professionals trained to respond to unique public health challenges and opportunities facing urban populations. The MPH program brings together interdisciplinary faculty (from the School of Law, D'Amore-McKim School of Business, College of Social Sciences and Humanities, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences) with expertise in collaborating with diverse urban populations to offer students an opportunity to obtain practice-based knowledge, skills, and experience needed to address public health problems.

Up to 9 credit hours of coursework in the JD program may count toward the MPH, while up to 12 credit hours of coursework in the MPH program may count toward the JD. See the JD/MPH program page (<https://law.northeastern.edu/academics/programs/jd/dual-degrees/public-health-bouve/>) for more information.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Pharmacy, PharmD—Direct Entry / Public Health, MPH (Boston)

The School of Pharmacy and Pharmaceutical Sciences and the Department of Health Sciences offer a combined Doctor of Pharmacy (PharmD) and Master of Public Health (MPH) program.

The combined PharmD/MPH program recognizes and reinforces the importance of public health in pharmacy practice. Central to addressing public health concerns, and in particular those associated with racial and ethnic health disparities, the program is committed to building a strong, diverse, and activist public health workforce. The goal of the program is to graduate professionals who are well educated in the complex issues associated with disparate health status and healthcare access. The combined PharmD/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust understanding of public health through an MPH degree while also completing their PharmD.

Refer to the School of Pharmacy and Pharmaceutical Sciences PharmD—Direct Entry (p. 939) and Department of Health Sciences Master of Public Health (p. 869) pages of this catalog for program requirements and technical standards. Students must adhere to all PharmD and MPH program standards, policies, and requirements as listed in the catalog, unless otherwise specified.

The Northeastern University Master of Public Health Program is accredited by the Council of Education for Public Health (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

Public Health, MPH / Health Informatics, MS (Boston)

Website (<https://bouve.northeastern.edu/health-sciences/programs/ms-hinf-mph/>)

The Master of Public Health and Master of Science in Health Informatics dual degree allows qualified and interested students to prepare to lead healthcare at the nexus between public health and health informatics. Graduates of this program will be well-educated in the complex issues associated with improvements in information technology, as well as changes to the public health and healthcare delivery systems. Recognizing the increasing overlap between health informatics and public health, this program incorporates course work from both the MPH and MSHI curricula for both degrees, reducing tuition costs and saving one year of study compared to obtaining both degrees individually.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH) (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

Up to 15 credits of coursework in the dual-degree program can be counted toward both the MPH and MS degrees.

AI Applications, Graduate Certificate (Boston)

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- College of Social Sciences and Humanities
- D'Amore-McKim School of Business
- Mills College at Northeastern

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

Experiential Courses

Code	Title	Hours
Complete 4 semester hours from the following:		4
CRIM 6600	Justice, Technology, and AI	
EDUT 6150	AI in Education	
HLTH 5800	AI Across the Health Sciences	
IE 5640	Data Mining for Engineering Applications	
JRNL 6460	AI in Media Industries	
MISM 6250	Strategic AI for Business	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Applied Psychology in Context, Graduate Certificate (Boston)

The Graduate Certificate in Applied Psychology in Context provides students with a strong foundation in scientific research and practice in applied psychology with options to focus in areas of interest, including child/adolescent/family, using a core and elective structure. The fully online, asynchronous graduate certificate offers students an opportunity to develop clinical skills for nonlicensed employees in healthcare, school, and other community-based organizations.

Program Requirements

Core Requirements

Code	Title	Hours
CAEP 5879	Trauma and Mental Health	3
CAEP 5880	Clinical Skills in Context	3
CAEP 6203	Understanding Culture and Diversity	3

Elective

Code	Title	Hours
Complete one of the following based on your area of focus:		3
CAEP 6242	Psychopathology: Diagnosis and Treatment Planning	
CAEP 6247	Child and Adolescent Psychopathology	

Program Credits/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Health Informatics Management and Exchange, Graduate Certificate (Boston)

Overview

The certificate program in health informatics management and exchange offers you the opportunity to obtain the knowledge needed to support the collection, management, retrieval, and exchange of electronic health data. It is designed to prepare you for a position as a specialist in data management, interoperability standards, and health database design.

- Eight-month program
- Five courses, 15 semester hours

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B– or higher is required in all coursework.

Code	Title	Hours
Required Core		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
Management and Exchange		
HINF 6205	Creation and Application of Medical Knowledge	3
HINF 6220	Database Design, Access, Modeling, and Security	3
HINF 6355	Interoperability Key Standards in Health Informatics	3

Program Credit/GPA Requirements

15 total semester hours required

Minimum 3.000 GPA required

School of Nursing

Website (<https://bouve.northeastern.edu/academics/school-of-nursing/>)

Amanda Choflet, DNP, RN, NEA-BC

Dean and Clinical Professor, School of Nursing

Lynn Reede, DNP, MBA, CRNA, FNAP

Assistant Dean of Graduate Programs and Associate Professor, School of Nursing

Office of the Dean

617.373.3521

617.373.2985 (fax)

Graduate Program Office

617.373.2521

This is a pivotal time in healthcare, and nursing plays a leading role in the transformation of our healthcare system. Northeastern University School of Nursing offers multiple options for graduate study—including master's, Doctor of Nursing Practice, Certificate of Advanced Graduate Study, as well as a PhD program—that are designed to prepare outstanding clinicians, leaders, scholars, educators, researchers, and policymakers. These programs leverage the school's renowned faculty, as well as exceptional clinical practicum sites. Our reputation is why our graduates are sought by top employers. Practicing advanced practice nurses may add a specialty area by enrolling in one of our CAGS programs in adult primary or acute, pediatric primary and acute, family, or mental health.

The master's program includes advanced practice degrees as well as a Master of Science in Nursing Leadership with four concentration options. Graduates of the master's program are advanced practice nurses and nurse leaders with roles in a variety of practice settings such as primary and acute care providers, patient safety specialists, executive nurse leaders, and clinical educators.

The DNP program is a practice-focused degree designed to prepare experienced nurses at the highest level of scholarly practice. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective change

agents. Graduates of our BSN-DNP and post-master's DNP program assume clinical and leadership positions as advanced nurses in a variety of roles including clinical experts, nurse executives, community leaders, and professional organization leaders.

The PhD program in nursing prepares research scientists, educators, and leaders who seek to improve health and healthcare across the life span with an emphasis on urban, vulnerable, and underserved populations. Graduates are expected to lead research initiatives that advance nursing science through knowledge development and interdisciplinary scholarly inquiry.

Further information about the degrees and specializations can be found at each program's page of this catalog.

Programs

Doctor of Philosophy (PhD)

- Nursing (Boston) (p. 888)

Doctor of Nursing Practice (DNP)

- Nurse Anesthesia (Boston) (p. 890)
- Nursing (Boston) (p. 892)
- Nursing—Post-Master's (Boston) (p. 895)
- Nursing—Post-Master's (Charlotte) (p. 896)

Certificate of Advanced Graduate Study (CAGS)

- Nursing with Concentration in Adult-Gerontology Nurse Practitioner, Acute Care (Boston) (p. 896)
- Nursing with Concentration in Adult-Gerontology Nurse Practitioner, Primary Care (Boston) (p. 897)
- Nursing with Concentration in Neonatal Nurse Practitioner (Boston) (p. 898)
- Nursing with Concentration in Pediatric Nurse Practitioner, Acute Care (Boston) (p. 898)
- Nursing with Concentration in Pediatric Nurse Practitioner, Acute and Primary Care (Boston) (p. 899)
- Nursing with Concentration in Pediatric Nurse Practitioner, Primary Care (Boston) (p. 900)
- Nursing with Concentration in Psychiatric-Mental Health Nurse Practitioner (Boston) (p. 900)

Master of Science (MS)

- Nursing (Boston) (p. 901)
- Nursing—Direct Entry (Boston) (p. 905)
- Nursing Leadership (Boston) (p. 909)

Graduate Certificate

- Patient Safety (Boston) (p. 815)
- Pediatric Nurse Practitioner, Acute Care (Boston) (p. 911)
- Primary Care Nursing FNP (Boston) (p. 912)

Nursing, PhD (Boston)

Overview

Research

The PhD in Nursing program is designed to prepare nurse researchers to advance the science of nursing by developing expertise in both leadership and innovation. Graduates are expected to lead multidisciplinary research initiatives that advance nursing and healthcare through knowledge development and interdisciplinary scholarly inquiry. Students will work with nursing faculty whose research addresses innovative questions that seek to advance knowledge for improvement of care. Students will have opportunities to collaborate with faculty across the broader Northeastern University community, in addition to Boston-area research and healthcare institutions. This collaboration allows students to work across disciplines and to access populations and research sites essential to the success of their original dissertation study.

Advanced entry into the PhD in Nursing program requires a master's degree in nursing.

Visit the Northeastern University Faculty Research site (<https://research.northeastern.edu/faculty-research/>) for more information.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/academics/learning-outcomes/>) for the specific student learning outcomes for this program.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS (<https://catalog.northeastern.edu/graduate/health-sciences/nursing/applied-nursing-research-ms/>) Applied Nursing Research degree. Note that no students will be admitted directly into the Applied Nursing Research program to pursue a master's degree.

Program Requirements

Bachelor's Degree Entrance

A bachelor's degree in nursing is preferred. Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review of progress
Comprehensive examination
Candidacy status
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Required Core		
NRSG 7104	Foundations in Nursing Research	3
NRSG 7700	The Science of Nursing	3
NRSG 7705	Theoretical and Conceptual Foundations in Nursing Science	3
NRSG 7715	Measurement in Clinical Research	3
NRSG 7750	Healthcare of Urban Populations	3
Statistics		
NRSG 5121	Epidemiology and Population Health	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 6210	Applied Regression Analysis	3
Research		
NRSG 7709	Qualitative Research Methods	3
NRSG 7712	Quantitative Research Methods	3
NRSG 7755	Intervention Research: Development, Implementation, and Evaluation	3
NRSG 7770	Research Colloquium	1
Complete the following (repeatable) course twice:		6
NRSG 9984	Research	
Cognate Courses		
Complete two cognate courses in consultation with your faculty advisor. Cognates are graduate-level courses that are taken outside of nursing. These courses should provide depth and breadth to the student's dissertation research.		6

Electives

Code	Title	Hours
Complete two elective courses in consultation with your faculty advisor. Electives may be taken in nursing or in an area related to the student's dissertation research, including appropriate methodology and statistics courses.		6

Dissertation

Code	Title	Hours
NRSG 9845	Dissertation Seminar 1	3
NRSG 9846	Dissertation Seminar 2	3
NRSG 9990	Dissertation Term 1	
NRSG 9991	Dissertation Term 2	

Program Credit/GPA Requirements

58 total semester hours required
Minimum 3.000 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review of progress
Comprehensive examination
Candidacy status
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Required Core		
NRSG 7700	The Science of Nursing	3
NRSG 7705	Theoretical and Conceptual Foundations in Nursing Science	3
NRSG 7750	Healthcare of Urban Populations	3
Statistics		
PHTH 5210	Biostatistics in Public Health	3
PHTH 6210	Applied Regression Analysis	3
Cognate Courses ¹		
Complete two cognate courses in consultation with your faculty adviser.		6
Research		
NRSG 7709	Qualitative Research Methods	3
NRSG 7712	Quantitative Research Methods	3
NRSG 7715	Measurement in Clinical Research	3
NRSG 7755	Intervention Research: Development, Implementation, and Evaluation	3
NRSG 7770	Research Colloquium	1
Complete the following (repeatable) course twice:		6
NRSG 9984	Research	

Dissertation Courses

Code	Title	Hours
NRSG 9845	Dissertation Seminar 1	3
NRSG 9846	Dissertation Seminar 2	3
NRSG 9990	Dissertation Term 1	
NRSG 9991	Dissertation Term 2	

Program Credit/GPA Requirements

46 total semester hours required

Minimum 3.000 GPA required

¹ Cognates are graduate-level courses that are taken outside of nursing and should provide depth and breadth to the student's area of interest.

Nurse Anesthesia, DNP (Boston)

The Doctor of Nursing Practice in Nurse Anesthesia is a practice-oriented degree designed to prepare nurse anesthetists at the highest level of clinical scholarly practice. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective change agents. The program prepares graduates to question practice, search for and critically appraise the best evidence to guide practice, and implement and evaluate the application of best evidence in practice.

A successful graduate from the program will gain the requisite skill set and leadership expertise to be a critical member of the healthcare team and provide anesthetics to patients throughout the life cycle in diverse settings such as small local hospitals, regional centers, and rural or urban settings for all types of surgery or procedures.

Transfer Policy

Northeastern University regulations for transfer credit are published in this catalog (p. 143). The transfer policy specific to this doctoral program is defined as a maximum of 9 semester hours or 12 quarter hours of credit earned at another institution may be accepted toward the degree being pursued at Northeastern, provided the credits:

1. Consist of work taken at the graduate level for graduate credit
2. Carry grades of 3.000 or better
3. Have been earned at an accredited institution
4. Have not been used toward any baccalaureate or advanced degree or certificate at another institution
5. Transfer credits must be approved by the program administrator and course faculty

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B or higher is required in all coursework.

Core Requirements

Code	Title	Hours
Required Core		
NRSG 5117	Advanced Pharmacology	2
NRSG 5121	Epidemiology and Population Health	3
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6300	Healthcare Finance and Marketing	3
NRSG 6302	Health Policy and Law	3
NRSG 6306	Health Informatics	3
NRSG 7100	Leadership in Advanced Practice Nursing	3
Didactic		
NRSG 7500	Role/Practice Issues in Advanced Practice Nursing	3
NRSG 7503	Pharmacotherapeutics in Anesthesia and Critical Care Nursing	3
NRSG 7506	Applied Chemistry, Physics, and Cardiopulmonary Physiology of Anesthesia	3
NRSG 7509	Advanced Concepts in Nurse Anesthesia Practice	3
NRSG 7511	Applied Gross Anatomy and Physiology of Anesthesia	3
NRSG 7520	Conceptual Basis of Nurse Anesthesia Practice 1	3
NRSG 7523	Conceptual Basis of Nurse Anesthesia Practice 2	3
NRSG 7526	Conceptual Basis of Nurse Anesthesia Practice 3	3
Practicum		
NRSG 7530	Nurse Anesthesia Practicum 1	3
NRSG 7533	Nurse Anesthesia Practicum 2	3
NRSG 7536	Nurse Anesthesia Practicum 3	4
Research		
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7920	The Steps to Practice Inquiry: Analyze, Evaluate, Synthesize, and Apply the Evidence	3
Project		
NRSG 7921	DNP Scholarly Project 1: Design and Ethical Consideration of Practice Application	3
NRSG 7922	DNP Scholarly Project 2: Applying Practice Knowledge—Implementation/Outcomes	3
NRSG 7923	DNP Scholarly Project 3: Dissemination of Practice Inquiry	3
Clinical		
NRSG 7540	Advanced Clinical Experiences in Nurse Anesthesia 1	1
NRSG 7543	Advanced Clinical Experiences in Nurse Anesthesia 2	2
NRSG 7546	Advanced Clinical Experiences in Nurse Anesthesia 3	2

Program Credit/GPA Requirements

77 total semester hours required

Minimum 3.000 GPA required

Nursing, DNP (Boston)

The Northeastern University Doctor of Nursing Practice program is designed to prepare future nurse leaders by integrating advanced evidence-based clinical practice, interdisciplinary collaboration, healthcare innovation, fiscal responsibility, and principles of leadership to impact patient and/or system-level outcomes. Utilizing implementation science and project management theory, the DNP students design and implement a DNP project that may include new models of care, implementing and evaluating evidence-based practice guidelines, performing a financial analysis of varying models of care, or analyzing and/or implementing healthcare policy. This Nursing, DNP program can be completed in 33 months of full-time study and is designed for students entering with a BS in Nursing who intend to practice as nurse practitioners.

Students who already possess a master's nursing degree (Post-Masters) and intend to complete the DNP should consider the Nursing, DNP-Post-Master's (<https://catalog.northeastern.edu/graduate/health-sciences/nursing/nursing-practice-dnp/>) program. Students entering with a bachelor's nursing degree who intend to practice as nurse executives, nurse educators, or patient safety specialists should consider the MS Nursing Leadership (p. 909) program. Students entering with a bachelor's nursing degree who intend to practice as nurse anesthetists should consider the Nurse Anesthesia, DNP (p. 890) program.

Please visit Bouvé College Program Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	2
NRSG 5121	Epidemiology and Population Health	3
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6300	Healthcare Finance and Marketing	3
NRSG 6302	Health Policy and Law	3
NRSG 6306	Health Informatics	3
NRSG 7100	Leadership in Advanced Practice Nursing	3
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7500	Role/Practice Issues in Advanced Practice Nursing	3
NRSG 7911	DNP Project Immersion 1	1
NRSG 7912	DNP Project Immersion 2	1
NRSG 7920	The Steps to Practice Inquiry: Analyze, Evaluate, Synthesize, and Apply the Evidence	3
NRSG 7921	DNP Scholarly Project 1: Design and Ethical Consideration of Practice Application	3
NRSG 7922	DNP Scholarly Project 2: Applying Practice Knowledge—Implementation/Outcomes	3
NRSG 7923	DNP Scholarly Project 3: Dissemination of Practice Inquiry	3
NRSG 7926	Applied Data Management	2

Concentrations

A concentration is required to complete this program.

- Adult-Gerontology Nurse Practitioner, Acute Care (p. 893)
- Adult-Gerontology Nurse Practitioner, Primary Care (p. 893)
- Family Nurse Practitioner, Primary Care (p. 893)
- Neonatal Nurse Practitioner, Acute Care (p. 894)
- Pediatric Nurse Practitioner, Acute and Primary Care (p. 894)

- Pediatric Nurse Practitioner, Primary Care (p. 894)
- Psychiatric-Mental Health Nurse Practitioner (p. 894)

Program Credit/GPA Requirements

Total program hours vary based on the concentration the student chooses

Minimum 3.000 GPA required

CONCENTRATION IN ADULT-GERONTOLOGY NURSE PRACTITIONER, ACUTE CARE

Code	Title	Hours
NRSG 6220	Nursing Management: Acute Episodic Illness	3
NRSG 6221	Nursing Management: Critical and Chronic Illness	3
NRSG 6241	Acute-Care Concepts in Nursing Practice	3
NRSG 6243	Diagnostic Reasoning and Clinical Decision Making in Acute Care	2
NRSG 6245	Advanced Practice Colloquium in Acute Care	2
NRSG 6246	Acute Care Pharmacology	2
NRSG 7220	Acute Care Practicum 1 (Adult-Gerontology)	4
NRSG 7221	Acute Care Practicum 2 (Adult-Gerontology)	4
NRSG 7222	Acute Care Practicum 3 (Adult-Gerontology)	4

PROGRAM CREDIT REQUIREMENT

72 total semester hours required, including program core requirements

CONCENTRATION IN ADULT-GERONTOLOGY NURSE PRACTITIONER, PRIMARY CARE

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6249	Health Promotion of Adult/Older Adult	3
NRSG 6253	Primary Care of Adult/Older Adult Health Problems	3
NRSG 6254	Primary Care of Adult/Older Adult Complex Patients	3
NRSG 6560	Nurse Practitioner Clinical Intensive	1
NRSG 6561	Advanced Nurse Practitioner Clinical Intensive	1
NRSG 7440	Adult/Older Adult Gerontology Primary Care Nursing Practicum 1	4
NRSG 7441	Adult/Older Adult Gerontology Primary Care Nursing Practicum 2	4
NRSG 7442	Adult/Older Adult Gerontology Primary Care Nursing Practicum 3	4

PROGRAM CREDIT REQUIREMENT

70 total semester hours required, including program core requirements

NURSING CONCENTRATION IN FAMILY NURSE PRACTITIONER, PRIMARY CARE

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6262	Pediatric Pharmacology	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6392	Family Theory	2
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6397	Healthcare of Women and the Pregnant Individual in Family Practice	3

PROGRAM CREDIT REQUIREMENT

72 total semester hours required, including program core requirements

CONCENTRATION IN NEONATAL NURSE PRACTITIONER, ACUTE CARE

Code	Title	Hours
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6230	Nursing Management: Critically Ill Neonatal 1	3
NRSG 6231	Nursing Management: Critically Ill Neonatal 2	3
NRSG 6232	Neonatal Pharmacology	2
NRSG 6392	Family Theory	2
NRSG 7431	Neonatal Advanced Practicum 1	4
NRSG 7432	Neonatal Advanced Practicum 2	4
NRSG 7433	Neonatal Advanced Practicum 3	4

PROGRAM CREDIT REQUIREMENT

68 total semester hours required, including program core requirements

CONCENTRATION IN PEDIATRIC NURSE PRACTITIONER, ACUTE AND PRIMARY CARE

Code	Title	Hours
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6262	Pediatric Pharmacology	2
NRSG 6264	Care of Well Child/Adolescent Health Promotion	3
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6267	Care of the Critically Ill Child	3
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6276	Diagnostic Reasoning and Clinical Decision Making in PNP Practice	2
NRSG 6459	Pediatric NP Practicum 1	2
NRSG 6460	Pediatric NP Practicum 2	5
NRSG 6461	Pediatric NP Practicum 3	5
NRSG 6463	Care of the Critically Ill Child Practicum	5

PROGRAM CREDIT REQUIREMENT

82 total semester hours required, including program core requirements

CONCENTRATION IN PEDIATRIC NURSE PRACTITIONER, PRIMARY CARE

Code	Title	Hours
NRSG 6262	Pediatric Pharmacology	2
NRSG 6264	Care of Well Child/Adolescent Health Promotion	3
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6276	Diagnostic Reasoning and Clinical Decision Making in PNP Practice	2
NRSG 6459	Pediatric NP Practicum 1	2
NRSG 6460	Pediatric NP Practicum 2	5
NRSG 6461	Pediatric NP Practicum 3	5

Program Credit Requirement

71 total semester hours required, including program core requirements

CONCENTRATION IN PSYCHIATRIC-MENTAL HEALTH NURSE PRACTITIONER

Code	Title	Hours
NRSG 6281	Dimensions of Clinical Psychiatric Practice	3
NRSG 6282	Clinical Psychopharmacology	3
NRSG 6283	Psychobiological Bases of Mental Health	3

NRSG 6286	Contemporary Psychotherapies—Theory and Practice	3
NRSG 6561	Advanced Nurse Practitioner Clinical Intensive	1
NRSG 7480	Advanced Psychiatric Nursing Practicum 1	4
NRSG 7481	Advanced Psychiatric Nursing Practicum 2	4
NRSG 7482	Advanced Psychiatric Nursing Practicum 3	4

PROGRAM CREDIT REQUIREMENT

70 total semester hours required, including program core requirements

Nursing, DNP—Post-Master's (Boston)

The Doctor of Nursing Practice (DNP) is a practice-oriented degree designed to prepare advanced nurses at the highest level of scholarly practice. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective change agents. Graduates of our post-master's DNP program assume clinical and leadership positions as advanced nurses in a variety of roles including clinical experts, nurse executives, community leaders, and professional organization leaders.

The Northeastern University post-master's DNP program includes advanced course work in leadership, practice inquiry, population health, informatics, and health policy. Our goal is to prepare the next generation of nurse leaders with a greater breadth of expertise so they can collaborate more effectively with interprofessional partners and provide leadership to enhance quality and safety. The DNP program curriculum is delivered online in an executive model hybrid format, with the on-ground meetings at the Boston campus.

If you are a registered nurse with at least two years of active advanced nursing experience, you may enter the DNP program after completing a master's degree in nursing or, in some cases, a related health field. A DNP Scholarly Project and 1,000 scholarly practice hours are required for program completion. A gap analysis upon admission will determine how many, if any, practice hours from a previously completed Master of Science in Nursing practicum qualify toward this practice hour requirement.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Required Core		
NRSG 7120	Healthcare Systems Finance	3
NRSG 7130	Healthcare Quality and Informatics	3
NRSG 7900	Leadership of Healthcare Systems Change	3
NRSG 7924	Applied Epidemiology for Advanced Nursing	3
NRSG 7925	Health Policy and Advocacy	3
Project		
NRSG 7919	Translation of Research for Evidence-Based Practice	3
NRSG 7921	DNP Scholarly Project 1: Design and Ethical Consideration of Practice Application	3
NRSG 7922	DNP Scholarly Project 2: Applying Practice Knowledge—Implementation/Outcomes	3
NRSG 7923	DNP Scholarly Project 3: Dissemination of Practice Inquiry	3

Elective

Code	Title	Hours
Complete 3 semester hours, selected in consultation with faculty program advisor.		3

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Nursing, DNP—Post-Master's (Charlotte)

The Doctor of Nursing Practice (DNP) is a practice-oriented degree designed to prepare advanced nurses at the highest level of scholarly practice. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective change agents. Graduates of our post-master's DNP program assume clinical and leadership positions as advanced nurses in a variety of roles including clinical experts, nurse executives, community leaders, and professional organization leaders.

The Northeastern University post-master's DNP program includes advanced course work in leadership, practice inquiry, population health, informatics, and health policy. Our goal is to prepare the next generation of nurse leaders with a greater breadth of expertise so they can collaborate more effectively with interprofessional partners and provide leadership to enhance quality and safety. The DNP program curriculum is delivered online in an executive model hybrid format, with the on-ground meetings at the Charlotte campus.

If you are a registered nurse with at least two years of active advanced nursing experience, you may enter the DNP program after completing a master's degree in nursing or, in some cases, a related health field. A DNP Scholarly Project and 1,000 scholarly practice hours are required for program completion. A gap analysis upon admission will determine how many, if any, practice hours from a previously completed Master of Science in Nursing practicum qualify toward this practice hour requirement.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Required Core		
NRSG 7900	Leadership of Healthcare Systems Change	3
NRSG 7120	Healthcare Systems Finance	3
NRSG 7130	Healthcare Quality and Informatics	3
NRSG 7924	Applied Epidemiology for Advanced Nursing	3
NRSG 7925	Health Policy and Advocacy	3
Project		
NRSG 7919	Translation of Research for Evidence-Based Practice	3
NRSG 7921	DNP Scholarly Project 1: Design and Ethical Consideration of Practice Application	3
NRSG 7922	DNP Scholarly Project 2: Applying Practice Knowledge—Implementation/Outcomes	3
NRSG 7923	DNP Scholarly Project 3: Dissemination of Practice Inquiry	3

Elective

Code	Title	Hours
Complete 3 semester hours, selected in consultation with faculty program advisor.		3

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Nursing—Adult-Gerontology Nurse Practitioner, Acute Care, CAGS (Boston)

The adult-gerontology acute-care nurse practitioner program is designed to prepare nurses for advanced-practice roles as clinical experts, managers, educators, and consultants. The program offers advanced study with a major focus on clinical experience. Nurses who possess a Master of Science are eligible for the Certificate of Advanced Graduate Study (CAGS) in this specialization.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Theory		
NRSG 6220	Nursing Management: Acute Episodic Illness	3
NRSG 6221	Nursing Management: Critical and Chronic Illness	3
NRSG 6241	Acute-Care Concepts in Nursing Practice	3
Practicum		
NRSG 6420	Adult-Gerontology Acute-Care Nursing Practicum 1	2
NRSG 6421	Adult-Gerontology Acute-Care Nursing Practicum 2	4
NRSG 6422	Adult-Gerontology Acute-Care Nursing Practicum 3	4

Electives

Code	Title	Hours
Complete 5 semester hours in the following subject area:		5
NRSG		

Program Credit/GPA Requirements

24 total semester hours required

Minimum 3.000 GPA required

Nursing—Adult-Gerontology Nurse Practitioner, Primary Care, CAGS (Boston)

The Certificate of Advanced Graduate Study (CAGS) with a concentration in Primary Care Adult-Gerontology Nurse Practitioner offers nurse practitioners (NPs) with certification in a different specialty the opportunity to prepare for practice providing high-quality adult primary care services as an adult-gerontology NP. Adult-gerontology NPs provide services to individuals across most of the life span in clinics, private practices, home care, long-term care, and day programs. Upon completion of the primary care program, graduates are eligible to sit for the adult-gerontology certification exam.

Prerequisite Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of the student's background, must have completed coursework in the following areas with a minimum grade of B.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Core Requirements

Students should refer to the Program Overview page for required program prerequisites.

A grade of B or higher is required in each course.

Code	Title	Hours
Required Courses		
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6249	Health Promotion of Adult/Older Adult	3
NRSG 6253	Primary Care of Adult/Older Adult Health Problems	3
NRSG 6254	Primary Care of Adult/Older Adult Complex Patients	3
NRSG 6449	Health Promotion of Adult/Older Adult Practicum	1
NRSG 6450	Adult/Older Adult Practicum 1	5
NRSG 6451	Adult/Older Adult Practicum 2	5
Elective		2

Program Credit/GPA Requirements

24 total semester hours required

Minimum 3.000 GPA required

Nursing—Neonatal Nurse Practitioner, CAGS (Boston)

The School of Nursing offers a certificate of advanced study for experienced nurses who have a master's degree in nursing and want to specialize in neonatal critical care. Applicants are required to have at least two years of level-3 or greater of neonatal intensive care unit experience before entering the program; most applicants have greater relevant experience. One year of full-time study offers the student an opportunity to increase skills and experience and enables the student to sit for the neonatal nurse practitioner certification exam offered by the National Certification Corporation for the obstetric, gynecologic, and neonatal nursing specialties.

Prerequisite or Equivalent Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of the student's background, must have completed coursework with content equivalent to the following courses with a minimum grade of B.

Code	Title	Hours
NRSB 5117	Advanced Pharmacology	
NRSB 5126	Pathophysiology for Advanced Practice	

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
Clinical		
NRSB 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSB 6230	Nursing Management: Critically Ill Neonatal 1	3
NRSB 6231	Nursing Management: Critically Ill Neonatal 2	3
NRSB 6232	Neonatal Pharmacology	2
Practicum		
NRSB 6430	Neonatal Clinical Practicum 1	4
NRSB 6431	Neonatal Clinical Practicum 2	4
NRSB 6432	Neonatal Clinical Practicum 3	2

Elective

Code	Title	Hours
Select courses in consultation with faculty advisor.		3
NRSB		

Program Credit/GPA Requirements

24 total semester hours required

Minimum 3.000 GPA required

Nursing—Pediatric Nurse Practitioner, Acute Care, CAGS (Boston)

The Certificate of Advanced Graduate Study (CAGS) with a concentration in Acute Care Pediatric Nurse Practitioner (PNP) is designed for nurses who possess an MS degree in nursing. Such applicants are eligible to apply for admission to this CAGS program for advanced preparation as a PNP.

Prerequisite Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of their background, must have completed coursework in the following areas with a minimum grade of B.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Students should refer to the program overview page for required program prerequisites.

A grade of B or higher is required in all coursework.

Code	Title	Hours
Required Courses		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6262	Pediatric Pharmacology	2
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6267	Care of the Critically Ill Child	3
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6461	Pediatric NP Practicum 3	5
NRSG 6463	Care of the Critically Ill Child Practicum	5

Program Credit/GPA Requirements

25 total semester hours required

Minimum 3.000 GPA required

Nursing—Pediatric Nurse Practitioner, Acute and Primary Care, CAGS (Boston)

The Certificate of Advanced Graduate Study (CAGS) with a concentration in dual Primary/Acute Care Pediatric Nurse Practitioner (PNP) is designed for nurses who possess an MS degree in nursing. Such applicants are eligible to apply for admission to this CAGS program for advanced preparation as a PNP.

Prerequisite Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of their background, must have completed coursework in the following areas with a minimum grade of B.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Students should refer to the program overview page for required program prerequisites.

A grade of B or higher is required in each course.

Code	Title	Hours
Required Courses		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6262	Pediatric Pharmacology	2

900 Nursing—Pediatric Nurse Practitioner, Primary Care, CAGS (Boston)

NRSG 6264	Care of Well Child/Adolescent Health Promotion	3
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6267	Care of the Critically Ill Child	3
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6460	Pediatric NP Practicum 2	5
NRSG 6461	Pediatric NP Practicum 3	5
NRSG 6463	Care of the Critically Ill Child Practicum	5

Program Credit/GPA Requirements

33 total semester hours required

Minimum 3.000 GPA required

Nursing—Pediatric Nurse Practitioner, Primary Care, CAGS (Boston)

The Certificate of Advanced Graduate Study (CAGS) with a concentration in Primary Care Pediatric Nurse Practitioner (PNP) is designed for nurses who possess an MS degree in nursing. Such applicants are eligible to apply for admission to this CAGS program for advanced preparation as a PNP.

Prerequisite or Equivalent Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of their background, must have completed coursework in the following areas with a minimum grade of B.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	
NRSG 5126	Pathophysiology for Advanced Practice	
NRSG 6115	Health Assessment	

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Required Courses		
NRSG 6262	Pediatric Pharmacology	2
NRSG 6264	Care of Well Child/Adolescent Health Promotion	3
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6460	Pediatric NP Practicum 2	5
NRSG 6461	Pediatric NP Practicum 3	5
Elective		
Complete 2 semester hours of graduate NRSG coursework.		2

Program Credit/GPA Requirements

24 total semester hours required

Minimum 3.000 GPA required

Nursing—Psychiatric-Mental Health Nurse Practitioner, CAGS (Boston)

The School of Nursing offers specialized and flexible program options in psychiatric mental health nursing for nurse practitioners (NPs) with certification in another specialty. Classes are offered during the late afternoon and early evening hours to accommodate the multiple responsibilities of adult learners. This is a 24-semester-hour program of study. Upon completion of the psychiatric mental health advanced practice Certificate of Advanced Graduate Study (CAGS) program, graduates are eligible to sit for available national certification exams in their area of practice.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Required Core		
NRSG 6281	Dimensions of Clinical Psychiatric Practice	3
NRSG 6282	Clinical Psychopharmacology	3
NRSG 6283	Psychobiological Bases of Mental Health	3
NRSG 6286	Contemporary Psychotherapies—Theory and Practice	3
NRSG 6287	Child and Adolescent Psychopharmacology	2
Practicum		
NRSG 6480	Psychiatric Practicum across the Life Span 1	5
NRSG 6481	Psychiatric Practicum across the Life Span 2	5

Program Credit/GPA Requirements

24 total semester hours required

Minimum 3.000 GPA required

Nursing, MS (Boston)

Northeastern University's School of Nursing offers seven nurse practitioner concentrations leading to a Master of Science in Nursing. The program provides a solid foundation in research, epidemiology, health assessment, advanced pharmacology and pathophysiology, and healthcare systems with on-ground or online didactic coursework and on-ground skills and clinical experiences. The program has a strong clinical focus with high-quality clinical rotations as top priority. Students graduate prepared to practice as novice advanced-practice providers and work across a variety of healthcare settings. Graduates become nurse clinicians, educators, scholars, researchers, and lifelong learners. Upon completion of the program, graduates are eligible to sit for all national certification exams in their specialty area.

Adult-Gerontology Acute-Care Nurse Practitioner Concentration

The adult-gerontology acute-care concentration seeks to prepare nurses for advanced-practice roles as clinical experts, educators, and consultants. The concentration provides advanced study with a major focus on clinical experience and prepares graduates to care for patients across the continuum of care, including tertiary care, rehabilitation, and home care.

Adult-Gerontology Primary Care Nurse Practitioner Concentration

With a focus on health equity, the adult-gerontology primary care concentration prepares nurses to provide high-quality, ethical, and inclusive primary care to individuals 13 years and older. Graduates care for patients in a wide variety of settings.

Family Nurse Primary Care Practitioner Concentration

The primary goal of the FNP concentration is to educate FNPs who are capable of providing evidence-based, culturally and linguistically competent, ethical primary healthcare to individuals and families in a variety of healthcare settings. The FNP concentration is offered in a hybrid format with the majority of the classes delivered online, coupled with live presentation sessions. Students are required to be on the Boston campus twice per semester. Upon completion, graduates are eligible to sit for all national certification exams in their area of practice.

Neonatal Nurse Practitioner Concentration

Neonatal critical care is a growing field, and Bouvé is at the forefront of providing experienced nurses with the knowledge, competence, and skill to be in demand across the country. We require applicants to have at least two years of level-3 neonatal intensive care unit experience before entering our program, and most applicants have more years of NICU experience. A registered nurse working in the NICU setting already has a significant base of nursing knowledge. The NNP concentration focuses on advanced nursing knowledge and clinical practice. Our graduates are prepared to make independent decisions in level-2 and level-3 NICUs, drawing on their experience and diagnostic abilities to affect lives every day.

Pediatric Nurse Practitioner Concentrations

These concentrations are designed to prepare nurses with the specialized skills needed to care for at-risk children living in urban settings, across the continuum of care. For nearly two decades, our PNP concentration prepared primary care PNPs to provide community-based, culturally sensitive primary care. More recently, building on the School of Nursing's foundation in evidence-based, interdisciplinary, urban healthcare, the PNP curriculum

was expanded to offer a concentration in acute care. Northeastern offers the only graduate nursing program in New England to prepare acute-care PNPs.

The School of Nursing offers two concentrations for the PNP student. The primary care concentration prepares students for the role of PNP focusing on well-child care and prevention and management of common acute and chronic illnesses. The acute- and primary care dual concentration prepares students for the primary care role, as well as the acute-care role. Pediatric acute-care nurse practitioners are prepared to care for patients with acute, complex, critical, and chronic illness in a variety of settings.

Psychiatric-Mental Health Concentration

The curriculum of the psychiatric-mental health concentration has a life span focus, with core course content covering all ages. The concentration emphasizes a biopsychosocial framework to develop the understanding of human development, etiology of psychiatric disorders, and treatment modalities geared toward working with individuals across the life span and their families. The course of study emphasizes diagnostic decision making; psychotherapeutic interventions, including individual, family, and group therapies; and psychopharmacology across the life span.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
Professional		
NRSG 5118	Healthcare System and Professional Role Development	3
NRSG 5121	Epidemiology and Population Health	3
Clinical		
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7110	Evidence-Based Practice Research Application	2

Concentrations

A concentration is required to complete this program.

- Adult-Gerontology Nurse Practitioner, Acute Care (p. 902)
- Adult-Gerontology Nurse Practitioner, Primary Care (p. 903)
- Family Nurse Practitioner, Primary Care (p. 903)
- Neonatal Nurse Practitioner (p. 904)
- Pediatric Nurse Practitioner, Acute and Primary Care (p. 904)
- Pediatric Nurse Practitioner, Primary Care (p. 904)
- Psychiatric-Mental Health Nurse Practitioner (p. 905)

Program Credit/GPA Requirements

Total program hours vary based on the concentration the student chooses

Minimum 3.000 GPA required

CONCENTRATION IN ADULT-GERONTOLOGY NURSE PRACTITIONER, ACUTE CARE

Code	Title	Hours
Clinical		
NRSG 6115	Health Assessment	3
NRSG 6222	Pharmacology of Adults and Older Adults	2
Theory		
NRSG 6220	Nursing Management: Acute Episodic Illness	3
NRSG 6221	Nursing Management: Critical and Chronic Illness	3
NRSG 6241	Acute-Care Concepts in Nursing Practice	3
Practicum		

NRSG 6420	Adult-Gerontology Acute-Care Nursing Practicum 1	2
NRSG 6421	Adult-Gerontology Acute-Care Nursing Practicum 2	4
NRSG 6422	Adult-Gerontology Acute-Care Nursing Practicum 3	4

ELECTIVE

Code	Title	Hours
Complete 3 semester hours in the following subject area:		3
NRSG		

PROGRAM CREDIT REQUIREMENT

43 total semester hours required, including program core requirements

CONCENTRATION IN ADULT-GERONTOLOGY NURSE PRACTITIONER, PRIMARY CARE

Code	Title	Hours
Clinical		
NRSG 6115	Health Assessment	3
NRSG 6222	Pharmacology of Adults and Older Adults	2
Required Core		
NRSG 6249	Health Promotion of Adult/Older Adult	3
NRSG 6253	Primary Care of Adult/Older Adult Health Problems	3
NRSG 6254	Primary Care of Adult/Older Adult Complex Patients	3
Practicum		
NRSG 6449	Health Promotion of Adult/Older Adult Practicum	1
NRSG 6450	Adult/Older Adult Practicum 1	5
NRSG 6451	Adult/Older Adult Practicum 2	5

ELECTIVE

Code	Title	Hours
Complete 2 semester hours in the following subject area:		2
NRSG		

PROGRAM CREDIT REQUIREMENT

43 total semester hours required, including program core requirements

NURSING CONCENTRATION IN FAMILY NURSE PRACTITIONER, PRIMARY CARE

Code	Title	Hours
Professional		
NRSG 6115	Health Assessment	3
Family		
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6392	Family Theory	2
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6395	Healthcare of Women in Family Practice	2
Clinical		
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6398	Prescribing Considerations in the Pediatric and Adolescent Populations	2
Practicum		
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6396	Practicum for NRSG 6395	4

PROGRAM CREDIT REQUIREMENT

47 total semester hours required, including program core requirements

CONCENTRATION IN NEONATAL NURSE PRACTITIONER

Code	Title	Hours
Clinical		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6230	Nursing Management: Critically Ill Neonatal 1	3
NRSG 6231	Nursing Management: Critically Ill Neonatal 2	3
NRSG 6232	Neonatal Pharmacology	2
Practicum		
NRSG 6430	Neonatal Clinical Practicum 1	4
NRSG 6431	Neonatal Clinical Practicum 2	4
NRSG 6432	Neonatal Clinical Practicum 3	2

ELECTIVE

Code	Title	Hours
Complete 4 semester hours at the graduate level from the following subject area:		4
NRSG		

PROGRAM CREDIT REQUIREMENT

41 total semester hours required, including program core requirements

CONCENTRATION IN PEDIATRIC NURSE PRACTITIONER, ACUTE & PRIMARY CARE

Code	Title	Hours
Clinical Core Courses		
NRSG 6115	Health Assessment	3
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6262	Pediatric Pharmacology	2
Clinical Theory Courses (*NRSG 6275 w/clinical component)		
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6264	Care of Well Child/Adolescent Health Promotion	3
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6267	Care of the Critically Ill Child	3
Clinical Practicum Courses		
NRSG 6460	Pediatric NP Practicum 2	5
NRSG 6461	Pediatric NP Practicum 3	5
NRSG 6463	Care of the Critically Ill Child Practicum	5

PROGRAM CREDIT REQUIREMENT

52 total semester hours required, including program core requirements

CONCENTRATION IN PEDIATRIC NURSE PRACTITIONER, PRIMARY CARE

Code	Title	Hours
Clinical Core Courses		
NRSG 6115	Health Assessment	3
NRSG 6262	Pediatric Pharmacology	2
Clinical Theory Courses (*NRSG 6275 w/clinical component)		
NRSG 6264	Care of Well Child/Adolescent Health Promotion	3
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
Clinical Practicum Courses		

NRSG 6460	Pediatric NP Practicum 2	5
NRSG 6461	Pediatric NP Practicum 3	5

PROGRAM CREDIT REQUIREMENT

41 total semester hours required, including program core requirements

CONCENTRATION IN PSYCHIATRIC-MENTAL HEALTH NURSE PRACTITIONER

Code	Title	Hours
Required Core		
NRSG 6281	Dimensions of Clinical Psychiatric Practice	3
NRSG 6282	Clinical Psychopharmacology	3
NRSG 6283	Psychobiological Bases of Mental Health	3
NRSG 6286	Contemporary Psychotherapies—Theory and Practice	3
NRSG 6287	Child and Adolescent Psychopharmacology	2
Clinical		
NRSG 6115	Health Assessment	3
Practicum		
NRSG 6480	Psychiatric Practicum across the Life Span 1	5
NRSG 6481	Psychiatric Practicum across the Life Span 2	5

PROGRAM CREDIT REQUIREMENT

43 total semester hours required, including program core requirements

Nursing, MS—Direct Entry (Boston)**Nursing, MS—Direct Entry****PART I: PRELICENSURE**

The direct-entry nursing student enters the accelerated master's program as a graduate student. The first 16 months (four semesters) of the program consists of intensive, sequential undergraduate classes and clinical. Students are then prepared to take the National Council Licensure Exam upon completion of 64 program semester hours to earn an RN license. Students earn a Bachelor of Science in Nursing after this part of the program. Financial aid will be granted on an undergraduate basis during the prelicensure phase of the program.

ENTRY RN WORK EXPERIENCE

Once a student graduates with a BSN, they are required to participate in an online, 0-semester-hour professional seminar for two semesters prior to progressing into their master's coursework. In addition, after passing the licensure exam, students must practice as a nurse for 6 to 12 months prior to progression into the master's core courses. Students may begin the master's core courses during the required practice period, with approval from the specialty concentration director.

Finding RN employment is the responsibility of the student, as it is professional nursing experience. Northeastern will help support the student in preparation for the job search. Please see MS Nursing (p. 901) for more information about the master's phase of the direct-entry program.

PART II: RETURN TO MASTER'S SPECIALTY TRACKS

In the master's program, students are required to take professional, research, and clinical core courses, as well as clinical courses specific to their concentration. Full- or part-time academic study is available to students. Most students return to the master's segment of the program taking coursework as a part-time student while continuing to work and increasing the amount of professional RN experience accrued. Completion of the master's degree can take four to six semesters, depending on the student's program plan and concentration. Upon completion of the requirements for their concentration, the student receives a Master of Science degree and is eligible to take the national certification exam in their area of advanced nursing practice. Financial aid is awarded on a graduate basis during this portion of the program.

Bouvé College of Health Sciences School of Nursing

The goal of the School of Nursing is to promote clinical judgment development and prepare students to practice nursing competently and compassionately in rapidly changing practice environments. All efforts are designed to build nursing knowledge; enhance nursing practice and patient safety; foster professional identity; and ultimately improve the health outcomes of patients, families, and communities across the continuum of care. This approach is built on eight pillars: leadership; quality care; scientific reasoning; practice excellence; diversity, equity, and inclusion; innovation; interdisciplinary collaboration; and practice excellence. The clinical program takes place in the community where people live, as well as in

hospitals, rehabilitation centers, and long-term-care facilities. The curriculum culminates in courses that allow students to apply their leadership and management skills while integrating the full scope of the professional nurse's role through a clinical practicum.

In addition to completing academic coursework, students participate in cooperative education as specified by their plan of study, which gives them the opportunity to integrate the theory and practice of nursing in selected settings. Numerous community and institutional healthcare agencies in the Greater Boston area and beyond offer students an opportunity to gain experience in providing patient care to a variety of patients and families and to understand that nurses have major roles in wellness and health promotion, acute care, and long-term care. Students in the program are highly encouraged to engage in research activities and explore global educational opportunities, both of which can be integral components of their studies.

The baccalaureate degree, the accelerated bachelor's degree (ABSN in Burlington and Fall River, Massachusetts), and the direct entry master's degree programs in nursing at Northeastern University are accredited by the Commission on Collegiate Nursing Education, 655 K Street, NW, Suite 750, Washington, DC 20001, 202-887-6791, and are also approved by the Board of Registration in Nursing of the Commonwealth of Massachusetts. The ABSN program in Charlotte is accredited by the Commission on Collegiate Nursing Education, 655 K Street, NW, Suite 750, Washington, DC 20001, 202-887-6791, and approved by the North Carolina Board of Nursing. Accreditation and approval indicate that the program meets educational standards for faculty, curriculum design, teaching quality, and overall university support.

ACADEMIC STANDARDS AND PROGRESSION POLICY (UNDERGRADUATE STUDENTS, DIRECT ENTRY, ACCELERATED PROGRAM FOR SECOND-DEGREE AND TRANSFER TRACK STUDENTS)

Academic standards and progression policies are reviewed and updated annually.

Students in the Bouvé College of Health Sciences, School of Nursing, Prelicensure Nursing Major of BSN, ABSN, Transfer Track, or DE (baccalaureate portion) will be dismissed from their major for any of the reasons noted in the catalog or a course failure, effective the following academic semester.

Course Failure

- Students who do not meet the required minimum grade of a C (73.0%) in two professional courses will be dismissed from the program. Professional courses include labs, clinical, and didactic classes that are designated nursing (NRSG) courses. Only one professional course can be repeated, and each course can be repeated once.
- Students must retake the failed professional course as a requirement for progression in the program. Students can repeat the failed course the next time it is offered within their specific program.
- Students will not be permitted to progress to the nursing clinical courses without successfully repeating the failed course.

Course Withdrawal

Only two professional course withdrawals will be permitted (excluding leave of absence). Students can only withdraw from each professional course once. More than two professional course withdrawals will lead to dismissal from the program. Based on the requirement that the theory course and the clinical/lab course are taken concurrently, a withdrawal in either the theory course or clinical lab course results in the student withdrawing from both courses. Personal leaves of absence will be considered on an individual basis.

ACADEMIC APPEALS

It is the policy of the university that all students shall be treated fairly in evaluations made of their academic performance, standing, and progress. The School of Nursing policy regarding academic appeals is consistent with Northeastern University. For more information about academic appeals policies and procedures see the Bouvé Appeals Policy at Academic Appeals (<https://catalog.northeastern.edu/undergraduate/health-sciences/>).

Program policies and standards may be found in the Pre-licensure Handbook (<https://bouve.northeastern.edu/wp-content/uploads/2024/11/northeastern-university-school-of-nursing-undergraduate-handbook-2024-2025.pdf>). Students are expected to adhere to the policies and standards of their program major as stated in the Student Handbook (<https://bouve.northeastern.edu/wp-content/uploads/2024/11/northeastern-university-school-of-nursing-undergraduate-handbook-2024-2025.pdf>) to progress through their curriculum as planned. Students seeking any exceptions to the program policies and standards specified for their program major can petition the School of Nursing Academic Standing Committee for their requests.

NURSING PROGRAM REQUIREMENTS

The nursing program offers multiple attendance options for students, as outlined below:

For First-Year (Freshman) Students (Including N.U.in) and Current Northeastern Students Changing Majors to BSN

- Four-Year Plan with Two Six-Month Co-Ops:
 - At least one co-op must involve working directly with registered nurses providing patient care.
 - All co-op experiences outlined in the academic plan must be completed with a grade of "S" (Satisfactory).

For those with a previous college degree or 62 college credits

- Accelerated Bachelor of Science in Nursing or Transfer Track:
 - Requires either a prior bachelor's degree with 66 transfer credits or a transfer track with 62 college credits (including prerequisites).
 - Features a 16-month, full-time hybrid program of nursing courses combining online coursework, clinical placements, and hands-on skills lab experience.
 - The Transfer Track includes an additional 4-credit Northeastern English course alongside nursing courses.
- Direct Entry Program:
 - Acceptance into the DE program includes the accelerated, pre-licensure, in-person program as well as an MSN program that will follow (NP specialty tracks).
 - Initial phase is 16 months (four semesters) of intensive undergraduate nursing courses and clinical training.

- Students are eligible to take the National Council Licensure Exam after completing 64 semester hours to earn an RN license.
- A Bachelor of Science in Nursing is awarded upon completing this phase, with financial aid provided at the undergraduate level during the pre-licensure phase.

GRADUATION REQUIREMENTS

All students, regardless of their entry point, must complete 130 semester hours of academic credit to meet university and nursing curriculum requirements and graduate within their expected time frame.

CLINICAL ATTENDANCE POLICY

Attendance in clinical is mandatory for all students. In the case of an illness, injury, or extenuating circumstance, which requires a student to miss clinical hours, students are required to make up missed hours. Clinical hours are to be completed on the clinical makeup day or as approved by the clinical coordinator. Failure to meet clinical course objectives due to missed clinical hours will result in course failure. To be eligible to make up hours, students are required to communicate an absence before clinical in a method required by the faculty.

Students must be fully compliant with onboarding and clinical clearance requirements to start the clinical course (see *Documentation of Immunity and Clinical Clearance*) and throughout the course. In addition, to the university's immunization requirements, students will adhere to the policies and procedures of assigned clinical sites and are required to complete a background check. *Students must be in compliance of all clinical clearance requirements at all times during the clinical portion of the program.* Students in Boston and Burlington will need to register in Exxat, an Education Management Platform for Health Sciences that tracks clinical compliance. Students in Charlotte will need to register with both Complio and My Clinical Exchange. All students will be advised at clinical orientation what is needed for their assigned clinical placement. If a student is noncompliant with health insurance and clinical clearance requirements, the student will be removed from clinical immediately.

Grounds for Clinical Warning, Removal from Clinical Site, and Clinical Course Failure

The following reasons will result in clinical course failure:

- Failure to meet clinical course outcomes and/or competencies
- Failure to demonstrate safe clinical practice
- Failure to adhere to the School of Nursing Code of Professional Conduct (<https://catalog.northeastern.edu/graduate/health-sciences/academic-policies-procedures/code-conduct-nurs/>)

Clinical Requirements

Please see School of Nursing Clinical settings policies (<https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/>).

TECHNICAL STANDARDS FOR ADMISSION, ACADEMIC PROGRESSION, AND GRADUATION

In addition to classroom learning, students' clinical education experiences occur in settings, like hospitals, in which patient safety is the priority. For this reason, students who, upon enrollment in any of the nursing programs, seek accommodations from Disability Access Services (<https://disabilityaccessservices.northeastern.edu/>) at Northeastern must also request an assessment of accommodations that would be needed for clinical education.

Certain functional abilities are essential for the delivery of safe, effective nursing care during clinical education activities. Therefore, the School of Nursing has determined that certain technical standards are requisite for admission, progression, and graduation from the nursing programs. An individual must be able to independently, with or without reasonable accommodation, meet the following technical standards:

1. General abilities
2. Observational ability
3. Communication ability
4. Motor ability
5. Intellectual, conceptual, and quantitative abilities
6. Behavioral and social attributes
7. Ability to manage stressful situations

Individuals unable to meet these technical standards, with or without reasonable accommodation, will not be able to complete the program.

General Abilities

The student is expected to possess functional use of the senses of vision, touch, hearing, and smell so that data received by the senses may be integrated, analyzed, and synthesized in a consistent and accurate manner. A student must be able to respond promptly to urgent situations that may occur during clinical training activities and must not hinder the ability of other members of the healthcare team to provide prompt treatment and care to patients.

Observational Ability

The student must have sufficient capacity to make accurate visual observations and interpret them in the context of laboratory studies, medication administration, and patient care activities. In addition, the student must be able to document these observations and maintain accurate records.

Communication Ability

The student must communicate both verbally and nonverbally in order to elicit information and to convey that information to others. Each student must have the ability to read and write accurately and comprehensively in English. The student must be able to thoroughly comprehend and fluently

speak the English language so as to facilitate communication with patients, families, professionals in healthcare settings, instructors, and other students. The student must also be able to present information in a professional, logical manner and to provide counseling and instruction in order to effectively care for patients and their families.

Motor Ability

The student must be able to perform gross and fine motor movements with sufficient coordination needed to perform complete physical examinations utilizing the techniques of inspection, palpation, percussion, auscultation, and other diagnostic maneuvers. A student must develop the skills needed to perform or assist with procedures, treatments, administration of medication, and the management and operation of diagnostic and therapeutic medical equipment. The student must possess the physical and mental stamina to meet the demands associated with extended periods of sitting, standing, moving, and physical exertion required for satisfactory and safe performance in the clinical and classroom settings.

Intellectual, Conceptual, and Quantitative Abilities

The student must be able to develop and refine critical thinking skills that are essential to nursing practice. Critical thinking involves the abilities to measure, calculate, reason, analyze, and synthesize objective and subjective data and to make decisions, often in a time-urgent environment, that reflect consistent and thoughtful deliberation and sound clinical judgment.

Behavioral and Social Attributes

Compassion, integrity, motivation, effective interpersonal skills, and concern for others are personal attributes required of those in the nursing programs. The student must be able to work under supervision of a clinical instructor or preceptor; this is essential to ensure patient safety. The student must exercise good judgment and promptly complete all responsibilities in the classroom and clinical settings. The ability to establish culturally competent relationships with individuals, families, and groups and to respond effectively to patients who have different intellectual capacities is critical to nursing practice.

Ability to Manage Stressful Situations

The student must be able to adapt to and function effectively in stressful situations in both the classroom and clinical settings, including emergency situations. These stressors include personal, patient care/family, faculty/peer, and/or program-related issues.

Disability and Special Needs

Students with special needs are encouraged to contact Disability Access Services (<https://disabilityaccessservices.northeastern.edu/>) to register and request services. Students must notify the instructor at the beginning of the semester if they plan to use DAS services throughout the course. The staff in that office is available for assistance.

STATE BOARD NURSING EXAMINATION

In Massachusetts, North Carolina, and several other states, the registering board requires that graduates taking the National Council Licensing Examination meet standards of “good moral character.” Students may review the GMC requirement specified at Massachusetts General Laws Chapter 112, sections 74, 74A, and 76; Licensure Policy No. 00-01 under “Rules & Regulations” on the Massachusetts Board of Registration in Nursing website. (<https://www.mass.gov/orgs/board-of-registration-in-nursing/>)

North Carolina requirements for licensure can be found on the North Carolina Board of Nursing website (<https://www.ncbon.com/>).

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or better in the BSN clinical courses is highly recommended for progression into the MSN portion of the program. Progression is at the graduate specialty director's discretion.

Students must successfully complete all courses with a grade of C or better except where otherwise indicated.

Code	Title	Hours
Semester 1		
HLTH 2100	Interprofessional Ethics for Individual and Population Health	4
NRSG 2215	Cultivating Nursing Professional Identity and Practice	3
NRSG 2222 and NRSG 2221	Health Assessment and Fundamental Nursing Skills and Lab for NRSG 2220 and NRSG 2222	5
NRSG 2350	Integrated Pathophysiology and Pharmaceutical Interventions for Nursing Practice	6
Semester 2		
NRSG 3320 and NRSG 3321	Nursing Care of Adults 1 and Clinical for NRSG 3320	6
NRSG 3333 and NRSG 3334	Comprehensive Assessment and Advanced Nursing Skills and Lab for NRSG 3333	4

NRSG 3400 and NRSG 3401	Nursing and the Promotion of Mental Health and Clinical for NRSG 3400	5
Semester 3		
NRSG 3420 and NRSG 3421	Nursing Care of Adults 2 and Clinical for NRSG 3420	6
NRSG 3344 and NRSG 3345	Nursing Care of the Childbearing Family and Clinical for NRSG 3344	3
NRSG 4504 and NRSG 4505	Nursing Care of Children and Clinical for NRSG 4504	3
NRSG 5220	Introduction to Research Methods and Application for Healthcare	4
Semester 4		
NRSG 4604 and NRSG 4605	Public Health Community Nursing and Clinical for NRSG 4604	5
NRSG 4610	Managing and Leading in Healthcare	4
NRSG 4889 and NRSG 4996	Transition into Nursing Practice and Clinical for NRSG 4995 and NRSG 4889	6

Program Credit / GPA Requirements

64 total semester hours required

Minimum 3.000 GPA required

Nursing Leadership, MS (Boston)

The Master of Science in Nursing Leadership program prepares future nurse leaders by integrating advanced evidence-based clinical practice, interdisciplinary collaboration, healthcare innovation, fiscal responsibility, and principles of leadership with a concentration in the areas of postsecondary teaching, nurse executive, patient safety, or artificial intelligence. The program provides theoretical content and experiential learning in diverse healthcare environments to examine healthcare services and quality, organizational systems analysis, fiscal responsibility, and strategies for student and peer evaluation and mentorship. Upon completion of a chosen concentration, students may consider national certification. Several examples include American Nurses Association Credentialing Center, providing certification as a Nurse Executive-Board Certified (NE-BC); National League for Nursing, providing certification as a Certified Academic Clinical Nurse Educator (CNEcl); and/or the Institute for Healthcare Improvement, providing certification as a Certified Professional in Patient Safety (CPPS).

Please visit Bouvé College Program Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	2
NRSG 5121	Epidemiology and Population Health	3
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6300	Healthcare Finance and Marketing	3
NRSG 6302	Health Policy and Law	3
NRSG 6306	Health Informatics	3
NRSG 7100	Leadership in Advanced Practice Nursing	3
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7500	Role/Practice Issues in Advanced Practice Nursing	3
NRSG 7911	DNP Project Immersion 1	1
NRSG 7920	The Steps to Practice Inquiry: Analyze, Evaluate, Synthesize, and Apply the Evidence	3
NRSG 7926	Applied Data Management	2

Concentrations and Program Credit Requirements

A concentration is required to complete this program.

- AI Applications (p. 910)
- Nurse Executive (p. 910)
- Patient Safety (p. 910)
- Postsecondary Teaching (p. 910)

Program Credit/GPA Requirements

Total program hours vary based on the concentration the student chooses

Minimum 3.000 GPA required

CONCENTRATION IN AI APPLICATIONS

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
HLTH 5800	AI Across the Health Sciences	4

Program Credit Requirement

47 total semester hours required, including program core requirements

CONCENTRATION IN NURSE EXECUTIVE

Code	Title	Hours
HLTH 5600	Introduction to Patient Safety	3
HLTH 5620	Leadership, Patient Safety, and Clinician Wellness	3
MSCI 6001	Principles of Healthcare Advocacy	3
MSCI 6003	Healthcare Leadership Seminar	3
NRSG 7990	Thesis	3
PHTH 6204	Society, Behavior, and Health	3

Program Credit Requirement

53 total semester hours required, including program core requirements

CONCENTRATION IN PATIENT SAFETY

Note: A student enrolled in this concentration may not also earn the Graduate Certificate in Patient Safety.

Code	Title	Hours
HLTH 5600	Introduction to Patient Safety	3
HLTH 5610	Patient Safety Science	3
HLTH 5620	Leadership, Patient Safety, and Clinician Wellness	3
HLTH 5630	Quality Improvement in Patient Safety	3

Program Credit Requirement

47 total semester hours required, including program core requirements

CONCENTRATION IN POSTSECONDARY TEACHING

Note: A student enrolled in this concentration may not also earn the Graduate Certificate in Postsecondary Teaching.

Code	Title	Hours
INPR 5100	Foundations of Evidence-based Postsecondary Teaching	4
INPR 5110	Integrating Teaching Across Contexts	4
INPR 5120	Postsecondary Teaching Practicum	4

Program Credit Requirement

47 total semester hours required, including program core requirements

Patient Safety, Graduate Certificate (Boston)

Overview

The Graduate Certificate in Patient Safety informs and empowers the next generations of innovative patient safety experts by providing the knowledge and practical skills to promote a culture of safety and design safer systems of care. Future leaders incorporate clinician wellness strategies in care delivery models that are accountable, honest, and transparent. The purpose of this certificate is to support healthcare clinicians and leaders in advancing patient safety and the safety of healthcare providers by expanding their fundamental skills and knowledge in patient safety science principles, workforce wellness, and quality improvement strategies.

This is a four-course, interdisciplinary graduate certificate, tailored to accommodate a busy healthcare professional's schedule. Courses are delivered in an online format, structured to enhance the curriculum with peer-to-peer discussions and experience developing tools, protocols, and process improvement strategies.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

A grade of B or higher is required in each course.

Code	Title	Hours
HLTH 5600	Introduction to Patient Safety	3
HLTH 5610	Patient Safety Science	3
HLTH 5620	Leadership, Patient Safety, and Clinician Wellness	3
HLTH 5630	Quality Improvement in Patient Safety	3

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.00 GPA required

Pediatric Nurse Practitioner, Acute Care, Graduate Certificate (Boston)

The post-master's acute-care PNP 16-credit graduate certificate for PNPs or FNP's certified in primary care seeking pediatric specialization in acute care is open to PNPs or FNP's certified in primary care with a master's or doctoral degree from an accredited institution. Graduates are eligible to sit for the acute-care PNP certification board exam.

Prerequisite Requirements

To ensure that all students have the foundation necessary to participate in this program, successful completion of the following courses or their equivalent within the past five years is required. Alternatively, active PNP/FNP experience with primary care PNP competencies (one-year minimum full-time pediatric experience) is required.

A grade of B or higher is required in each course.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	
NRSG 5126	Pathophysiology for Advanced Practice	
NRSG 6115	Health Assessment	
NRSG 6262	Pediatric Pharmacology	
NRSG 6265	Care of Child/Adolescent Health Problems	
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6267	Care of the Critically Ill Child	3

NRSG 6461	Pediatric NP Practicum 3 ¹	5
NRSG 6463	Care of the Critically Ill Child Practicum ¹	5

¹ Direct clinical hours included

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Primary Care Nursing FNP, Graduate Certificate (Boston)

The Northeastern University Family Nurse Practitioner graduate certificate is designed to prepare Advanced Practice Registered Nurses who have completed a master's degree and certification in another APRN specialty to be eligible to obtain national certification (AACN or AANP) as a Family Nurse Practitioner. FNP's provide healthcare services across the life span and in a variety of settings including, but not limited to, neighborhood centers, private practice, school-based clinics, in the home, long-term care facilities, and hospice.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
NRSG 6392	Family Theory	2
NRSG 6561	Advanced Nurse Practitioner Clinical Intensive	1

Options

- For Licensed Pediatric Nurse Practitioners/Pediatric Clinical Nurse Specialists (p. 912)
- For Licensed Nurse Midwives (p. 912)
- For Licensed Adult/Gerontology Primary Nurse Practitioners/CNS Adult (p. 913)
- For Licensed Adult/Gerontology Acute Care Nurse Practitioners/Adult/Acute Clinical Nurse Specialists (p. 913)
- For Licensed Psychiatric Mental Health Nurse Practitioners/PMH Clinical Nurse Specialists (p. 913)
- For Licensed Neonatal Nurse Practitioners (p. 913)
- For Licensed Nurse Anesthetists (p. 914)

Program Credit/GPA Requirements

19–29 total semester hours required

Minimum 3.000 GPA required

OPTION FOR LICENSED PEDIATRIC NURSE PRACTITIONERS/PEDIATRIC CLINICAL NURSE SPECIALISTS

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Pediatric Nurse Practitioners/Pediatric Clinical Nurse Specialists must complete the following:

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults (Total Program Hours)	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6396	Practicum for NRSG 6395	4

OPTION FOR LICENSED NURSE MIDWIVES

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Nurse Midwives must complete the following:

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6262	Pediatric Pharmacology	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4

OPTION FOR LICENSED ADULT/GERONTOLOGY PRIMARY NURSE PRACTITIONERS/CNS ADULT

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Adult/Gerontology Primary Nurse Practitioners/CNS Adult students must complete the following:

Code	Title	Hours
NRSG 6262	Pediatric Pharmacology	2
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6396	Practicum for NRSG 6395	4

OPTION FOR LICENSED ADULT/GERONTOLOGY ACUTE CARE NURSE PRACTITIONERS/ADULT/ACUTE CLINICAL NURSE SPECIALISTS

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Adult/Gerontology Acute Care Nurse Practitioners/Adult/Acute Clinical Nurse Specialists must complete the following:

Code	Title	Hours
NRSG 6262	Pediatric Pharmacology	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6396	Practicum for NRSG 6395	4

OPTION FOR LICENSED PSYCHIATRIC MENTAL HEALTH NURSE PRACTITIONERS/PMH CLINICAL NURSE SPECIALISTS

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Psychiatric Mental Health Nurse Practitioners/PMH Clinical Nurse Specialists must complete the following:

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6262	Pediatric Pharmacology	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6396	Practicum for NRSG 6395	4

OPTION FOR LICENSED NEONATAL NURSE PRACTITIONERS

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Neonatal Nurse Practitioners must complete the following:

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6262	Pediatric Pharmacology	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4

NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6396	Practicum for NRSG 6395	4

OPTION FOR LICENSED NURSE ANESTHETISTS

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Nurse Anesthetists must complete the following:

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6262	Pediatric Pharmacology	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6396	Practicum for NRSG 6395	4

School of Pharmacy and Pharmaceutical Sciences

Website (<https://bouve.northeastern.edu/academics/school-of-pharmacy-and-pharmaceutical-sciences/>)

Michael J. Gonyeau, BS Pharm, PharmD, MEd, FNAP, FCCP, BCPS, RPh

Interim Dean and Clinical Professor

140 The Fenway

617.373.5127

617.373.7655 (fax)

SOPPS@northeastern.edu (schoolofpharmacy@northeastern.edu)

The School of Pharmacy and Pharmaceutical Sciences provides transformative learning and research experiences in a collaborative and diverse environment to develop leaders who positively impact the health and well-being across the life span of those we serve. SOPPS will be the model for excellence and innovation in pharmacy and pharmaceutical sciences education that is grounded in experiential learning and enhances the health of communities through research and practice.

Programs

Doctor of Philosophy (PhD)

- Biomedical Science (Boston) (p. 915)
- Medicinal Chemistry and Drug Discovery (Boston) (p. 921)
- Pharmaceutics and Drug Delivery (Boston) (p. 927)
- Pharmacology (Boston) (p. 933)

Doctor of Pharmacy (PharmD)

- Doctor of Pharmacy (Boston) (p. 938)
- Doctor of Pharmacy—Direct Entry (Boston) (p. 939)

Master of Science (MS)

- Biomedical Science (Boston) (p. 945)
- Medicinal Chemistry and Drug Discovery (Boston) (p. 947)
- Pharmaceutical Engineering (Boston) (p. 507)
- Pharmaceutics and Drug Delivery (Boston) (p. 952)
- Pharmacology (Boston) (p. 955)

Dual Degree

- Pharmacy, PharmD—Direct Entry/Public Health, MPH (Boston) (p. 811)

Graduate Certificate

- Cannabis Science, Graduate Certificate (Boston) (p. 812)

Biomedical Science, PhD (Boston)

The Department of Pharmaceutical Sciences offers a PhD program in biomedical science that focuses on the cross-disciplinary integration of human (patho)biology with drug action, invention, and clinical utility. The biomedical sciences curriculum involves coursework and original research in areas including drug design and profiling, toxicology, and pharmaceutical biochemistry/cell biology aimed at increasing our understanding of how unsolved medical needs may be addressed by novel therapeutic approaches. The biomedical science program is appropriate for those entering the field as well as persons currently employed as research technicians, clinical laboratory workers, and science teachers/administrators. The flexibility of the biomedical science program and its interdisciplinary nature can enhance job performance in a present position and invite new employment opportunities.

Journal Club Participation

The Department of Pharmaceutical Sciences sponsors weekly journal clubs, Pharmaceutical Science Seminar (PHSC 6300), at which students present and evaluate current scientific literature in their fields of study. Students must attend one of these journal clubs (Pharmaceutics & Drug Delivery Journal Club, Pharmacology Journal Club, or Medicinal Chemistry & Drug Discovery Journal Club), chosen in consultation with their advisors.

Attendance at one of these journal clubs is required each and every academic semester, as an integral part of the PhD curriculum, with the exception of the last year (year four) in the program. All PhD students must participate full-time in journal club for course credit, Pharmaceutical Science Seminar (PHSC 6300), for six semesters. Failure to attend journal club regularly may result in sanctions such as probation or dismissal from the PhD program. Any student who does not comply with these (or any other) conditions required in the PhD program faces potential dismissal.

Colloquium Attendance

All PhD students, regardless of program, are required to attend the weekly Pharmaceutical Science Colloquium series. Announcements of times and locations will be distributed weekly to students by email to their university email addresses. Attendance is recorded by sign-up sheet. One excused absence is permitted per semester. Failure to attend colloquia may result in sanctions such as probation or dismissal from the PhD program.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in the pharmaceutical and biotechnology industries.

After PhD candidates have completed their dissertation research and are working on their dissertations, they are able, with the express permission of their PhD advisor, to participate in an internship if they choose. They are never allowed to intern while they are serving as teaching assistants.

1. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Students are responsible for tracking this experience on their resumés as there will be no detailed record on students' transcripts of these opportunities.
2. In order to be eligible for internship, students must take Professional Development for Pharmaceutical Sciences (PHSC 5305) a semester before internship.
3. Students must not accept more than one position. They must honor the first offer accepted. Any student not adhering to this requirement will not be allowed to participate.
4. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training authorization from the Office of Global Services (<https://international.northeastern.edu/ogs/>) every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the postgraduation benefit of Post-Completion Optional Practical Training.
5. In order to receive a grade for the course, students must write at least two learning goals within the first two weeks of the internship and a one- to two-page paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
6. Taking internship must not extend international students' visas.
7. There are no vacations on internships. Companies' sick time policies may vary. Students should check with their employers. For all other matters, please see the Universitywide Academic Policies and Procedures (p. 87) and/or Bouvé College of Health Sciences Academic Policies and Procedures (p. 772).

Milestones

QUALIFYING EXAMINATION

The PhD qualifying examination is required for students in all four programs under the auspices of the Department of Pharmaceutical Sciences: pharmacology, medicinal chemistry and drug discovery, biomedical sciences, and pharmaceutics and drug delivery. Students from each of the four programs will take the exams within the same time frame (below), regardless of specialty-area program focus.

Doctoral students should have selected a dissertation advisor by the end of their first year in the program and are expected to have begun research and demonstrated initial proficiency in the laboratory before taking the PhD qualifying examination.

The PhD qualifying examination tests the candidates' knowledge and skills in core courses and program content areas. The overall PhD qualifying examination consists of two written exams and one oral exam. The qualifying examination is taken as a course, Doctoral Training and Research

(PHSC 8940), no later than during the fall semester of the student's second year, after having successfully completed all the core courses of their respective programs.

At least two departmental faculty will contribute questions for the written exams, and no one faculty member will write more than the equivalent of one entire exam. All students qualified to sit for the exams are expected to take them at the times announced.

The format for the written exams may vary (e.g., faculty may ask a series of comprehensive essay questions or provide research publications(s) from the biomedical literature and ask questions based upon the publications' content). The first exam is given in the first week of fall semester, with the written portion of the second exam (i.e., the F31 written document) to be submitted to the student's exam committee by the end of October, with the oral presentation to be completed by mid-November and graded by the providers of the question(s).

- **Written exam 1** reflects students' knowledge of their specialty-area program material and of overall pharmaceutical sciences. This exam is given on the same day in two parts. Part 1 is focused on each student's specialty-area program focus. Part 2 will test students' overall knowledge in another program focus covered by the pharmaceutical sciences curriculum.
 - For example, if the student is in the pharmaceuticals and drug delivery PhD program, part 1 will be about pharmaceuticals and drug delivery, and part 2 can focus either on pharmacology or medicinal chemistry and drug discovery.
- **Written exam 2** requires that students write an NIH F31 grant proposal and have the proposal signed off as passing by their examination committee after an oral defense.

A score of at least 70% is required to pass the first written exam (two parts). Students must pass all written portions of the PhD qualifying examination prior to the oral defense of the F31 proposal. Students who fail one written exam will have one opportunity to retake and pass that examination. A student who fails the first exam twice will be required to withdraw from the PhD program.

During the oral exam, students defend their NIH F31 grant proposal before an examination committee of, minimally, four faculty members: the dissertation advisor, at least two other Department of Pharmaceutical Sciences faculty members, and at least one member from outside the department. This committee is convened only for the oral exam and does not need to be the same committee as the student's dissertation committee.

Members of the oral examination committee are selected by the student, after consultation with the dissertation advisor and/or the director of graduate studies. The oral exam is graded on a satisfactory/unsatisfactory basis. Students who fail the oral exam on the first attempt may retake the exam within a time period designated by the examination committee not to exceed two months from the first oral exam. Those who fail twice will be dismissed from the program.

DOCTORAL CANDIDACY STATUS

Doctoral students who have completed satisfactorily and thereby earned the credits for all required core courses (including those for their specialized area) and who have passed the written and oral qualifying examinations shall be admitted to candidacy status for the PhD degree.

DOCTORAL DISSERTATION COMMITTEE

Doctoral students must complete a dissertation that embodies the results of extended research and makes an original contribution to their field. This work should give evidence of candidates' abilities to conduct independent investigation and interpret the results of their research in a professional manner. The doctoral dissertation advisor serves as chairperson of the Doctoral Dissertation Committee, which consists of no fewer than five members. Selection of an advisor is by mutual consent of the student and a member of the faculty, with approval by the director of graduate studies in the Department of Pharmaceutical Sciences. At least two members of the Doctoral Dissertation Committee must be faculty members in the Department of Pharmaceutical Sciences. At least one member is to be selected from outside the department. Committee members are chosen for their expertise in students' research areas.

DISSERTATION PROPOSAL DEFENSE

Within a year after successful completion of the PhD qualifying examination, but no later than the beginning of the fall semester of the third year, students must prepare and defend a written proposal detailing their planned dissertation project. Failure to do so will be regarded as a failure to progress in the PhD program and will result in a warning from the director of graduate studies of the Department of Pharmaceutical Sciences.

Students who do not correct this deficiency within one semester will be placed on academic probation. Students on academic probation must complete the dissertation proposal defense and return to nonprobationary status within one semester or be dismissed from the PhD program.

The dissertation proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should otherwise conform to the format and structure of an NIH grant proposal with four main sections: specific aims, background and significance, preliminary studies, and experimental design and methods. The Department of Pharmaceutical Sciences "Dissertation Proposal" document provides detailed instructions on the preparation of a dissertation proposal. Associated required forms may be found in the School of Pharmacy and Pharmaceutical Sciences Student Portal on Canvas in the module section.

The dissertation proposal must be defended orally before the student's dissertation committee and signed by all dissertation committee members in *approval of the student's planned dissertation research*. Upon dissertation approval, the committee must sign the proposal approval cover sheet (<https://app.smartsheet.com/b/form/bd964901f0324ef4981d1673ab45b4c9/>), which is automatically submitted to the department's director of graduate studies and to the Bouvé College of Health Sciences Graduate Office.

BIANNUAL REVIEW

Dissertation committees meet routinely at six-month intervals, but no less than once a year, to evaluate students' research progress and to be presented with written and oral progress reports on the direction and status of the research. Progress reports should be written in a brief format, identical to that described for the formal dissertation (see instructions listed on the SOPPS Student Portal Canvas site). Unsatisfactory productivity provides the basis for a warning by the dissertation committee and/or the Graduate Committee. Two such warnings will result in a student's dismissal from the program.

Registration for Dissertation

Advisor consent and completion of all coursework (with the exception of the colloquium course) must be documented before students register for the first dissertation course. Students must register for Dissertation Term 1 (PHSC 9990) and Dissertation Term 2 (PHSC 9991). Students must register for Dissertation Continuation (PHSC 9996) each semester thereafter until the dissertation has been successfully defended. The department strongly encourages PhD students to complete the program within five years after acceptance, i.e., by three years after establishing degree candidacy. According to university policy, no PhD students may remain in the program for more than seven years.

Publications and Presentations

Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

PhD Dissertation Preparation

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found on the SOPPS Student Portal Canvas site. The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

PHARMACEUTICAL SCIENCES COLLOQUIUM

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

ORAL DISSERTATION DEFENSE

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

The dissertation committee conducts the final defense. The committee may recommend that the student clarify, amplify, or rewrite portions of the dissertation *before the final defense is scheduled*. Once the committee concurs that that written dissertation document is acceptable, a date is chosen for the final oral examination.

At least two weeks prior to the defense, students should inform the director of graduate studies in the Department of Pharmaceutical Sciences of the date of defense, so that advance announcement may be distributed. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student in a seminar format, and responses to audience and committee questions, the committee meets first with the student for any follow-up discussion and then in executive session to decide whether the student has defended the dissertation successfully.

The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

Deadline

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

SOPPS CODE OF PROFESSIONAL CONDUCT

All SOPPS students (BSPS, Preprofessional, MS, and PhD) are expected to adhere to the Code of Professional Conduct (<https://bouve.northeastern.edu/assets/uploads/sites/5/2021/10/northeastern-school-of-pharmacy-code-of-professional-conduct-2021.pdf>).

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
 Doctoral candidacy status
 Doctoral dissertation committee
 Dissertation proposal
 Biannual review
 Pharmaceutical Sciences Colloquium
 Oral dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following repeatable course for six semesters:		6
PHSC 6300	Pharmaceutical Science Seminar	
Required Core		
Complete the following:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5305	Professional Development for Pharmaceutical Sciences	1
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 6214	Experimental Design and Biostatistics	2

Electives

Code	Title	Hours
Students must complete one course from each of the following specialization areas for a total of three courses:		8-10
Pharmaceutics & Drug Delivery		
Complete one of the following:		
PMST 6250	Advanced Physical Pharmacy	
PMST 6252	Pharmacokinetics and Drug Metabolism	
PMST 6254	Advanced Drug Delivery Systems	
Pharmacology		
Complete one of the following:		
PMCL 6250	Ion Channel Physiology and Pharmacology	
PMCL 6252	Small-Molecule Target and Ligand Pharmacology	
Medicinal Chemistry & Drug Discovery		
Complete one of the following:		
CHEM 5626	Organic Synthesis 1	
CHEM 5628	Principles of Spectroscopy of Organic Compounds	
PHSC 5450	Contemporary Approaches to Drug Design	

Research and Dissertation

Code	Title	Hours
Prequalifying Exam Course		
PHSC 7020	Scientific Writing: Thesis Proposal	2
Qualifying Exam		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	

PHSC 9991	Dissertation Term 2	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Program Credit/GPA Requirements

31 - 33 total semester hours required

Minimum 3.000 GPA required

Plan of Study (Standard Program)

Sample Plan

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 5212		2 PHSC 7020 ¹	2
PHSC 5100		2 PHSC 6214		2	
PHSC 5102		2 PHSC 6300		1	
During the first year of courses, students must complete one course for each specialization:		3-6 During the first year of courses, students must complete one course for each specialization:		2-7	
Available in Fall semester:		Available in Spring semester:			
Pharmaceutics & Drug Delivery:		Pharmaceutics & Drug Delivery:			
PMST 6254		PMST 6250 or 6252			
Pharmacology:		Pharmacology:			
PMCL 6250		PMCL 6252			
Medicinal Chemistry & Drug Discovery:		Medicinal Chemistry & Drug Discovery:			
CHEM 5626 or 5628		PHSC 5450			
		10-11		8-12	2
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 ²	2
PHSC 8940		1 PHSC 8986		0	
		2		1	2
Year 3					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0
Year 4					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 5305 ⁴		1 PHSC 6213 ⁴		2 PHSC 9996	0
PHSC 6810 ³		1 PHSC 9996		0	
		2		2	0
Total Hours: 31-36					

¹ Scientific Writing: Thesis Proposal (PHSC 7020) must be taken the summer before the qualifying exams.

² Doctoral Proposal (PHSC 9681) should be taken in summer of second year, but no later than fall of third year.

³ Pharmaceutical Science Colloquium (PHSC 6810) must be taken six months before dissertation defense.

⁴ PHSC 5305 & PHSC 6213 is suggested to be taken in the fourth year, but can be taken at any point before graduation.

Sample Plan of Study - Advanced Entry

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 ¹	2
PHSC 8940		1 PHSC 8986 or 9681 ¹		0	
		2		1	2
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0
Year 3					
Fall	Hours	Spring	Hours		
PHSC 6810 ²		1 PHSC 6213		2	
		PHSC 9996		0	
		1		2	
Total Hours: 10					

¹ Doctoral Proposal (PHSC 9681 (<https://catalog.northeastern.edu/search/?P=PHSC%209681>)) may be taken in spring of the first year but must be taken before fall of the second year.

² Pharmaceutical Science Colloquium (PHSC 6810 (<https://catalog.northeastern.edu/search/?P=PHSC%206810>)) must be taken six months before the dissertation defense.

Advanced Entry Program Requirements

Advanced entry into the PhD program in biomedical science requires a master's degree in pharmaceutical sciences or a related area and focuses on various advanced research courses, and successful defense of the dissertation. . An applicant's transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying examination
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Required		
PHSC 6213	Ethical Problems in Health Sciences Research	2
Seminar		
Complete the following repeatable course four times:		4
PHSC 6300	Pharmaceutical Science Seminar	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Research and Dissertation

Code	Title	Hours
Qualifying Examination		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		

PHSC 9990	Dissertation Term 1
PHSC 9991	Dissertation Term 2

Program Credit/GPA Requirements

10 total semester hours required

Minimum 3.000 GPA required

Plan of Study (Advanced Entry)

Sample Plan of Study - Advanced Entry

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 ¹	2
PHSC 8940		1 PHSC 8986 or 9681 ¹		0	
		2		1	2
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0
Year 3					
Fall	Hours	Spring	Hours		
PHSC 6810 ²		1 PHSC 6213		2	
		PHSC 9996		0	
		1		2	

Total Hours: 10

¹ Doctoral Proposal (PHSC 9681 (<https://catalog.northeastern.edu/search/?P=PHSC%209681>)) may be taken in spring of the first year but must be taken before fall of the second year.

² Pharmaceutical Science Colloquium (PHSC 6810 (<https://catalog.northeastern.edu/search/?P=PHSC%206810>)) must be taken six months before the dissertation defense.

Medicinal Chemistry and Drug Discovery, PhD (Boston)

The PhD Program in Medicinal Chemistry and Drug Discovery educates and trains students in the design and synthesis of novel, biologically active compounds and in delineating their mechanisms of action using biochemical, biophysical, and pharmacological approaches. Research specializations are available in synthetic, biochemical/pharmacological, and biophysical aspects of medicinal chemistry. Doctoral research in these specializations will relate to faculty areas of research, which currently include substance use disorders and addiction; neuropathic pain; obesity and metabolic disorders; neuropsychiatric disorders (psychoses, ADHD, depression, anxiety, eating disorders); and neurodegenerative diseases.

Journal Club Participation

The Department of Pharmaceutical Sciences sponsors weekly journal clubs, Pharmaceutical Science Seminar (PHSC 6300), at which students present and evaluate current scientific literature in their fields of study. Students must attend one of these journal clubs (Pharmaceutics & Drug Delivery Journal Club, Pharmacology Journal Club, or Medicinal Chemistry & Drug Discovery Journal Club), chosen in consultation with their advisors.

Attendance at one of these journal clubs is required each and every academic semester, as an integral part of the PhD curriculum, with the exception of the last year (year four) in the program. All PhD students must participate full-time in journal club for course credit, Pharmaceutical Science Seminar (PHSC 6300), for six semesters. Failure to attend journal club regularly may result in sanctions such as probation or dismissal from the PhD program. Any student who does not comply with these (or any other) conditions required in the PhD program faces potential dismissal.

Colloquium Attendance

All PhD students, regardless of program, are required to attend the weekly Pharmaceutical Science Colloquium series. Announcements of times and locations will be distributed weekly to students by email to their university email addresses. Attendance is recorded by sign-up sheet. One excused absence is permitted per semester. Failure to attend colloquia may result in sanctions such as probation or dismissal from the PhD program.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in the pharmaceutical and biotechnology industries.

After PhD candidates have completed their dissertation research and are working on their dissertations, they are able, with the express permission of their PhD advisor, to participate in an internship if they choose. They are never allowed to intern while they are serving as teaching assistants.

1. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Students are responsible for tracking this experience on their resumés as there will be no detailed record on students' transcripts of these opportunities.
2. In order to be eligible for internship, students must take Professional Development for Pharmaceutical Sciences (PHSC 5305) a semester before internship.
3. Students must not accept more than one position. They must honor the first offer accepted. Any student not adhering to this requirement will not be allowed to participate.
4. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training authorization from the Office of Global Services (<https://international.northeastern.edu/ogs/>) every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the postgraduation benefit of Post-Completion Optional Practical Training.
5. In order to receive a grade for the course, students must write at least two learning goals within the first two weeks of the internship and a one- to two-page paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
6. Taking internship must not extend international students' visas.
7. There are no vacations on internships. Companies' sick time policies may vary. Students should check with their employers. For all other matters, please see the Universitywide Academic Policies and Procedures (p. 87) and/or Bouvé College of Health Sciences Academic Policies and Procedures (p. 772).

Milestones

QUALIFYING EXAMINATION

The PhD qualifying examination is required for students in all four programs under the auspices of the Department of Pharmaceutical Sciences: pharmacology, medicinal chemistry and drug discovery, biomedical sciences, and pharmaceuticals and drug delivery. Students from each of the four programs will take the exams within the same time frame (below), regardless of specialty-area program focus.

Doctoral students should have selected a dissertation advisor by the end of their first year in the program and are expected to have begun research and demonstrated initial proficiency in the laboratory before taking the PhD qualifying examination.

The PhD qualifying examination tests the candidates' knowledge and skills in core courses and program content areas. The overall PhD qualifying examination consists of two written exams and one oral exam. The qualifying examination is taken as a course, Doctoral Training and Research (PHSC 8940), no later than during the fall semester of the student's second year, after having successfully completed all the core courses of their respective programs.

At least two departmental faculty will contribute questions for the written exams, and no one faculty member will write more than the equivalent of one entire exam. All students qualified to sit for the exams are expected to take them at the times announced.

The format for the written exams may vary (e.g., faculty may ask a series of comprehensive essay questions or provide research publications(s) from the biomedical literature and ask questions based upon the publications' content). The first exam is given in the first week of fall semester, with the written portion of the second exam (i.e., the F31 written document) to be submitted to the student's exam committee by the end of October, with the oral presentation to be completed by mid-November and graded by the providers of the question(s).

- **Written exam 1** reflects students' knowledge of their specialty-area program material and of overall pharmaceutical sciences. This exam is given on the same day in two parts. Part 1 is focused on each student's specialty-area program focus. Part 2 will test students' overall knowledge in another program focus covered by the pharmaceutical sciences curriculum.
 - For example, if the student is in the pharmaceuticals and drug delivery PhD program, part 1 will be about pharmaceuticals and drug delivery, and part 2 can focus either on pharmacology or medicinal chemistry and drug discovery.
- **Written exam 2** requires that students write an NIH F31 grant proposal and have the proposal signed off as passing by their examination committee after an oral defense.

A score of at least 70% is required to pass the first written exam (two parts). Students must pass all written portions of the PhD qualifying examination prior to the oral defense of the F31 proposal. Students who fail one written exam will have one opportunity to retake and pass that examination. A student who fails the first exam twice will be required to withdraw from the PhD program.

During the oral exam, students defend their NIH F31 grant proposal before an examination committee of, minimally, four faculty members: the dissertation advisor, at least two other Department of Pharmaceutical Sciences faculty members, and at least one member from outside the department. This committee is convened only for the oral exam and does not need to be the same committee as the student's dissertation committee.

Members of the oral examination committee are selected by the student, after consultation with the dissertation advisor and/or the director of graduate studies. The oral exam is graded on a satisfactory/unsatisfactory basis. Students who fail the oral exam on the first attempt may retake the exam within a time period designated by the examination committee not to exceed two months from the first oral exam. Those who fail twice will be dismissed from the program.

DOCTORAL CANDIDACY STATUS

Doctoral students who have completed satisfactorily and thereby earned the credits for all required core courses (including those for their specialized area) and who have passed the written and oral qualifying examinations shall be admitted to candidacy status for the PhD degree.

DOCTORAL DISSERTATION COMMITTEE

Doctoral students must complete a dissertation that embodies the results of extended research and makes an original contribution to their field. This work should give evidence of candidates' abilities to conduct independent investigation and interpret the results of their research in a professional manner. The doctoral dissertation advisor serves as chairperson of the Doctoral Dissertation Committee, which consists of no fewer than five members. Selection of an advisor is by mutual consent of the student and a member of the faculty, with approval by the director of graduate studies in the Department of Pharmaceutical Sciences. At least two members of the Doctoral Dissertation Committee must be faculty members in the Department of Pharmaceutical Sciences. At least one member is to be selected from outside the department. Committee members are chosen for their expertise in students' research areas.

DISSERTATION PROPOSAL DEFENSE

Within a year after successful completion of the PhD qualifying examination, but no later than the beginning of the fall semester of the third year, students must prepare and defend a written proposal detailing their planned dissertation project. Failure to do so will be regarded as a failure to progress in the PhD program and will result in a warning from the director of graduate studies of the Department of Pharmaceutical Sciences.

Students who do not correct this deficiency within one semester will be placed on academic probation. Students on academic probation must complete the dissertation proposal defense and return to nonprobationary status within one semester or be dismissed from the PhD program.

The dissertation proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should otherwise conform to the format and structure of an NIH grant proposal with four main sections: specific aims, background and significance, preliminary studies, and experimental design and methods. The Department of Pharmaceutical Sciences "Dissertation Proposal" document provides detailed instructions on the preparation of a dissertation proposal. Associated required forms may be found in the School of Pharmacy and Pharmaceutical Sciences Student Portal on Canvas in the module section.

The dissertation proposal must be defended orally before the student's dissertation committee and signed by all dissertation committee members in *approval of the student's planned dissertation research*. Upon dissertation approval, the committee must sign the proposal approval cover sheet (<https://app.smartsheet.com/b/form/bd964901f0324ef4981d1673ab45b4c9/>), which is automatically submitted to the department's director of graduate studies and to the Bouvé College of Health Sciences Graduate Office.

BIANNUAL REVIEW

Dissertation committees meet routinely at six-month intervals, but no less than once a year, to evaluate students' research progress and to be presented with written and oral progress reports on the direction and status of the research. Progress reports should be written in a brief format, identical to that described for the formal dissertation (see instructions listed on the SOPPS Student Portal Canvas site). Unsatisfactory productivity provides the basis for a warning by the dissertation committee and/or the Graduate Committee. Two such warnings will result in a student's dismissal from the program.

Registration for Dissertation

Advisor consent and completion of all coursework (with the exception of the colloquium course) must be documented before students register for the first dissertation course. Students must register for Dissertation Term 1 (PHSC 9990) and Dissertation Term 2 (PHSC 9991). Students must register for Dissertation Continuation (PHSC 9996) each semester thereafter until the dissertation has been successfully defended. The department strongly encourages PhD students to complete the program within five years after acceptance, i.e., by three years after establishing degree candidacy. According to university policy, no PhD students may remain in the program for more than seven years.

Publications and Presentations

Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

PhD Dissertation Preparation

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found on the SOPPS Student Portal Canvas site. The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

PHARMACEUTICAL SCIENCES COLLOQUIUM

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

ORAL DISSERTATION DEFENSE

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

The dissertation committee conducts the final defense. The committee may recommend that the student clarify, amplify, or rewrite portions of the dissertation *before the final defense is scheduled*. Once the committee concurs that that written dissertation document is acceptable, a date is chosen for the final oral examination.

At least two weeks prior to the defense, students should inform the director of graduate studies in the Department of Pharmaceutical Sciences of the date of defense, so that advance announcement may be distributed. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student in a seminar format, and responses to audience and committee questions, the committee meets first with the student for any follow-up discussion and then in executive session to decide whether the student has defended the dissertation successfully.

The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

Deadline

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

SOPPS CODE OF PROFESSIONAL CONDUCT

All SOPPS students (BSPS, Preprofessional, MS, and PhD) are expected to adhere to the Code of Professional Conduct (<https://bouve.northeastern.edu/assets/uploads/sites/5/2021/10/northeastern-school-of-pharmacy-code-of-professional-conduct-2021.pdf>).

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
 Doctoral candidacy status
 Doctoral dissertation committee
 Dissertation proposal
 Biannual review
 Pharmaceutical Sciences Colloquium
 Oral dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following repeatable course for six semesters:		6
PHSC 6300	Pharmaceutical Science Seminar	
Required Core		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5305	Professional Development for Pharmaceutical Sciences	1
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 6214	Experimental Design and Biostatistics	2
Medicinal Chemistry and Drug Discovery		
CHEM 5626	Organic Synthesis 1	3

CHEM 5628	Principles of Spectroscopy of Organic Compounds	3
PHSC 5450	Contemporary Approaches to Drug Design	3

Research and Dissertation

Code	Title	Hours
Pre-Qualifying Exam Course		
PHSC 7020	Scientific Writing: Thesis Proposal	2
Qualifying Exam		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	
PHSC 9991	Dissertation Term 2	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Plan of Study (Standard Program)

Plan of Study

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
CHEM 5626		3 PHSC 5212		2 PHSC 7020 ¹	2
CHEM 5628		3 PHSC 5450		3	
PHSC 5100		2 PHSC 6214		2	
PHSC 5102		2 PHSC 6300		1	
PHSC 6300		1			
		11		8	2
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 ²	2
PHSC 8940		1 PHSC 8986		0	
		2		1	2
Year 3					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0
Year 4					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 5305 ⁴		1 PHSC 6213 ⁴		2 PHSC 9996	0
PHSC 6810 ³		1 PHSC 9996		0	
		2		2	0
Total Hours: 32					

¹ Scientific Writing: Thesis Proposal (PHSC 7020) must be taken the summer before the qualifying exams.

² Doctoral Proposal (PHSC 9681) should be taken in summer of second year, but no later than fall of third year.

³ Pharmaceutical Science Colloquium (PHSC 6810) must be taken six months before dissertation defense.

⁴ PHSC 5305 & PHSC 6213 is suggested to be taken in the fourth year, but can be taken at any point before graduation.

Plan of Study - Advanced Entry

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 ¹	2
PHSC 8940		1 PHSC 8986 or 9681 ¹		0	
		2		1	2
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0
Year 3					
Fall	Hours	Spring	Hours		
PHSC 6810 ²		1 PHSC 6213		2	
		PHSC 9996		0	
		1		2	
Total Hours: 10					

¹ Doctoral Proposal (PHSC 9681 (<https://catalog.northeastern.edu/search/?P=PHSC%209681>)) may be taken in spring of first year but must be taken before fall of second year.

² Pharmaceutical Science Colloquium (PHSC 6810 (<https://catalog.northeastern.edu/search/?P=PHSC%206810>)) must be taken six months before dissertation defense.

Advanced Entry Program Requirements

Advanced entry into the Medicinal Chemistry and Drug Discovery PhD program requires a master's degree in pharmaceutical sciences or a related area and focuses on various advanced research courses and successful defense of the dissertation. An applicant's transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying examination
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Required		
PHSC 6213	Ethical Problems in Health Sciences Research	2
Seminar		
Complete the following repeatable course four times:		4
PHSC 6300	Pharmaceutical Science Seminar	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Research and Dissertation

Code	Title	Hours
Qualifying Examination		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2

Dissertation

PHSC 9990	Dissertation Term 1
PHSC 9991	Dissertation Term 2

Program Credit/GPA Requirements

10 total semester hours required

Minimum 3.000 GPA required

Plan of Study (Advanced Entry)**Plan of Study - Advanced Entry**

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 ¹	2
PHSC 8940		1 PHSC 8986 or 9681 ¹		0	
		2		1	2
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0
Year 3					
Fall	Hours	Spring	Hours		
PHSC 6810 ²		1 PHSC 6213		2	
		PHSC 9996		0	
		1		2	

Total Hours: 10

¹ Doctoral Proposal (PHSC 9681 (<https://catalog.northeastern.edu/search/?P=PHSC%209681>)) may be taken in spring of first year but must be taken before fall of second year.

² Pharmaceutical Science Colloquium (PHSC 6810 (<https://catalog.northeastern.edu/search/?P=PHSC%206810>)) must be taken six months before dissertation defense.

Pharmaceutics and Drug Delivery, PhD (Boston)

The PhD Program in Pharmaceutics and Drug Delivery educates and trains students in the fundamental areas of physical pharmacy and pharmaceutics. Several specialized areas include:

- Novel drug delivery systems
- Nanomedical technologies
- Biopharmaceutics and pharmacokinetics

With exposure to these facets of the pharmaceutical sciences, successful graduates are poised to understand and assimilate the field of modern pharmaceutics. A PhD degree in pharmaceutics is a research degree. While coursework plays an important role, students become active participants in the science of pharmaceutics in the laboratory. Faculty research in pharmaceutical sciences covers a broad range of scientific interests including pharmacokinetic toxicodynamics of anticancer agents; use of novel biomaterials and synthetic polymeric systems in designing small-molecule drug delivery systems for small molecules, proteins, and nucleic acids; passive and active targeting of therapeutic agents for cancer and cardiovascular diseases; novel delivery systems for immunostimulating purposes; and mathematical modeling of endogenous compounds.

Journal Club Participation

The Department of Pharmaceutical Sciences sponsors weekly journal clubs, Pharmaceutical Science Seminar (PHSC 6300), at which students present and evaluate current scientific literature in their fields of study. Students must attend one of these journal clubs (Pharmaceutics & Drug Delivery Journal Club, Pharmacology Journal Club, or Medicinal Chemistry & Drug Discovery Journal Club), chosen in consultation with their advisors.

Attendance at one of these journal clubs is required each and every academic semester, as an integral part of the PhD curriculum, with the exception of the last year (year four) in the program. All PhD students must participate full-time in journal club for course credit, Pharmaceutical Science Seminar (PHSC 6300), for six semesters. Failure to attend journal club regularly may result in sanctions such as probation or dismissal from the PhD program. Any student who does not comply with these (or any other) conditions required in the PhD program faces potential dismissal.

Colloquium Attendance

All PhD students, regardless of program, are required to attend the weekly Pharmaceutical Science Colloquium series. Announcements of times and locations will be distributed weekly to students by email to their university email addresses. Attendance is recorded by sign-up sheet. One excused absence is permitted per semester. Failure to attend colloquia may result in sanctions such as probation or dismissal from the PhD program.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in the pharmaceutical and biotechnology industries.

After PhD candidates have completed their dissertation research and are working on their dissertations, they are able, with the express permission of their PhD advisor, to participate in an internship if they choose. They are never allowed to intern while they are serving as teaching assistants.

1. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Students are responsible for tracking this experience on their resumés as there will be no detailed record on students' transcripts of these opportunities.
2. In order to be eligible for internship, students must take Professional Development for Pharmaceutical Sciences (PHSC 5305) a semester before internship.
3. Students must not accept more than one position. They must honor the first offer accepted. Any student not adhering to this requirement will not be allowed to participate.
4. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training authorization from the Office of Global Services (<https://international.northeastern.edu/ogs/>) every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the postgraduation benefit of Post-Completion Optional Practical Training.
5. In order to receive a grade for the course, students must write at least two learning goals within the first two weeks of the internship and a one- to two-page paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
6. Taking internship must not extend international students' visas.
7. There are no vacations on internships. Companies' sick time policies may vary. Students should check with their employers. For all other matters, please see the Universitywide Academic Policies and Procedures (p. 87) and/or Bouvé College of Health Sciences Academic Policies and Procedures (p. 772).

Milestones

QUALIFYING EXAMINATION

The PhD qualifying examination is required for students in all four programs under the auspices of the Department of Pharmaceutical Sciences: pharmacology, medicinal chemistry and drug discovery, biomedical sciences, and pharmaceutics and drug delivery. Students from each of the four programs will take the exams within the same time frame (below), regardless of specialty-area program focus.

Doctoral students should have selected a dissertation advisor by the end of their first year in the program and are expected to have begun research and demonstrated initial proficiency in the laboratory before taking the PhD qualifying examination.

The PhD qualifying examination tests the candidates' knowledge and skills in core courses and program content areas. The overall PhD qualifying examination consists of two written exams and one oral exam. The qualifying examination is taken as a course, Doctoral Training and Research (PHSC 8940), no later than during the fall semester of the student's second year, after having successfully completed all the core courses of their respective programs.

At least two departmental faculty will contribute questions for the written exams, and no one faculty member will write more than the equivalent of one entire exam. All students qualified to sit for the exams are expected to take them at the times announced.

The format for the written exams may vary (e.g., faculty may ask a series of comprehensive essay questions or provide research publications(s) from the biomedical literature and ask questions based upon the publications' content). The first exam is given in the first week of fall semester, with the written portion of the second exam (i.e., the F31 written document) to be submitted to the student's exam committee by the end of October, with the oral presentation to be completed by mid-November and graded by the providers of the question(s).

- **Written exam 1** reflects students' knowledge of their specialty-area program material and of overall pharmaceutical sciences. This exam is given on the same day in two parts. Part 1 is focused on each student's specialty-area program focus. Part 2 will test students' overall knowledge in another program focus covered by the pharmaceutical sciences curriculum.
 - For example, if the student is in the pharmaceutics and drug delivery PhD program, part 1 will be about pharmaceutics and drug delivery, and part 2 can focus either on pharmacology or medicinal chemistry and drug discovery.
- **Written exam 2** requires that students write an NIH F31 grant proposal and have the proposal signed off as passing by their examination committee after an oral defense.

A score of at least 70% is required to pass the first written exam (two parts). Students must pass all written portions of the PhD qualifying examination prior to the oral defense of the F31 proposal. Students who fail one written exam will have one opportunity to retake and pass that examination. A student who fails the first exam twice will be required to withdraw from the PhD program.

During the oral exam, students defend their NIH F31 grant proposal before an examination committee of, minimally, four faculty members: the dissertation advisor, at least two other Department of Pharmaceutical Sciences faculty members, and at least one member from outside the department. This committee is convened only for the oral exam and does not need to be the same committee as the student's dissertation committee.

Members of the oral examination committee are selected by the student, after consultation with the dissertation advisor and/or the director of graduate studies. The oral exam is graded on a satisfactory/unsatisfactory basis. Students who fail the oral exam on the first attempt may retake the exam within a time period designated by the examination committee not to exceed two months from the first oral exam. Those who fail twice will be dismissed from the program.

DOCTORAL CANDIDACY STATUS

Doctoral students who have completed satisfactorily and thereby earned the credits for all required core courses (including those for their specialized area) and who have passed the written and oral qualifying examinations shall be admitted to candidacy status for the PhD degree.

DOCTORAL DISSERTATION COMMITTEE

Doctoral students must complete a dissertation that embodies the results of extended research and makes an original contribution to their field. This work should give evidence of candidates' abilities to conduct independent investigation and interpret the results of their research in a professional manner. The doctoral dissertation advisor serves as chairperson of the Doctoral Dissertation Committee, which consists of no fewer than five members. Selection of an advisor is by mutual consent of the student and a member of the faculty, with approval by the director of graduate studies in the Department of Pharmaceutical Sciences. At least two members of the Doctoral Dissertation Committee must be faculty members in the Department of Pharmaceutical Sciences. At least one member is to be selected from outside the department. Committee members are chosen for their expertise in students' research areas.

DISSERTATION PROPOSAL DEFENSE

Within a year after successful completion of the PhD qualifying examination, but no later than the beginning of the fall semester of the third year, students must prepare and defend a written proposal detailing their planned dissertation project. Failure to do so will be regarded as a failure to progress in the PhD program and will result in a warning from the director of graduate studies of the Department of Pharmaceutical Sciences.

Students who do not correct this deficiency within one semester will be placed on academic probation. Students on academic probation must complete the dissertation proposal defense and return to nonprobationary status within one semester or be dismissed from the PhD program.

The dissertation proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should otherwise conform to the format and structure of an NIH grant proposal with four main sections: specific aims, background and significance, preliminary studies, and experimental design and methods. The Department of Pharmaceutical Sciences "Dissertation Proposal" document provides detailed instructions on the preparation of a dissertation proposal. Associated required forms may be found in the School of Pharmacy and Pharmaceutical Sciences Student Portal on Canvas in the module section.

The dissertation proposal must be defended orally before the student's dissertation committee and signed by all dissertation committee members in *approval of the student's planned dissertation research*. Upon dissertation approval, the committee must sign the proposal approval cover sheet (<https://app.smartsheet.com/b/form/bd964901f0324ef4981d1673ab45b4c9/>), which is automatically submitted to the department's director of graduate studies and to the Bouvé College of Health Sciences Graduate Office.

BIANNUAL REVIEW

Dissertation committees meet routinely at six-month intervals, but no less than once a year, to evaluate students' research progress and to be presented with written and oral progress reports on the direction and status of the research. Progress reports should be written in a brief format, identical to that described for the formal dissertation (see instructions listed on the SOPPS Student Portal Canvas site). Unsatisfactory productivity provides the basis for a warning by the dissertation committee and/or the Graduate Committee. Two such warnings will result in a student's dismissal from the program.

Registration for Dissertation

Advisor consent and completion of all coursework (with the exception of the colloquium course) must be documented before students register for the first dissertation course. Students must register for Dissertation Term 1 (PHSC 9990) and Dissertation Term 2 (PHSC 9991). Students must register for Dissertation Continuation (PHSC 9996) each semester thereafter until the dissertation has been successfully defended. The department strongly encourages PhD students to complete the program within five years after acceptance, i.e., by three years after establishing degree candidacy. According to university policy, no PhD students may remain in the program for more than seven years.

Publications and Presentations

Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

PhD Dissertation Preparation

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found on the SOPPS Student Portal Canvas site. The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

PHARMACEUTICAL SCIENCES COLLOQUIUM

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

ORAL DISSERTATION DEFENSE

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

The dissertation committee conducts the final defense. The committee may recommend that the student clarify, amplify, or rewrite portions of the dissertation *before the final defense is scheduled*. Once the committee concurs that that written dissertation document is acceptable, a date is chosen for the final oral examination.

At least two weeks prior to the defense, students should inform the director of graduate studies in the Department of Pharmaceutical Sciences of the date of defense, so that advance announcement may be distributed. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student in a seminar format, and responses to audience and committee questions, the committee meets first with the student for any follow-up discussion and then in executive session to decide whether the student has defended the dissertation successfully.

The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

Deadline

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

SOPPS CODE OF PROFESSIONAL CONDUCT

All SOPPS students (BSPS, Preprofessional, MS, and PhD) are expected to adhere to the Code of Professional Conduct (<https://bouve.northeastern.edu/assets/uploads/sites/5/2021/10/northeastern-school-of-pharmacy-code-of-professional-conduct-2021.pdf>).

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
 Doctoral candidacy status
 Doctoral dissertation committee
 Dissertation proposal
 Biannual review
 Pharmaceutical Science Colloquium
 Oral dissertation defense

Core Requirements

Code	Title	Hours
Seminar		
Complete the following (repeatable) course for six semesters:		6
PHSC 6300	Pharmaceutical Science Seminar	
Required Core		
PHSC 5100	Concepts in Pharmaceutical Science	2

PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5305	Professional Development for Pharmaceutical Sciences	1
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 6214	Experimental Design and Biostatistics	2
Pharmaceutics		
PMST 6250	Advanced Physical Pharmacy	2
PMST 6252	Pharmacokinetics and Drug Metabolism	3
PMST 6254	Advanced Drug Delivery Systems	3

Research and Dissertation

Code	Title	Hours
Prequalifying Exam Course		
PHSC 7020	Scientific Writing: Thesis Proposal	2
Qualifying Examination		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	
PHSC 9991	Dissertation Term 2	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Program Credit/GPA Requirements

31 total semester hours required

Minimum 3.000 GPA required

Plan of Study (Standard Program)

Year 1

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 7020 ¹	2
PHSC 5100		2 PHSC 5212		2	
PHSC 5102		2 PHSC 6214		2	
PMST 6254		3 PMST 6250		2	
		PMST 6252		3	
		8		10	2

Year 2

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 ²	2
PHSC 8940		1 PHSC 8986		0	
		2		1	2

Year 3

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0

Year 4

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6810 ³		1 PHSC 9996		0 PHSC 9996	0
PHSC 5305 ⁴		1 PHSC 6213 ⁴		2	
		2		2	0

Total Hours: 31

- 1
Scientific Writing: Thesis Proposal (PHSC 7020) must be taken the summer before the qualifying exams.
- 2
Doctoral Proposal (PHSC 9681) should be taken in summer of second year but no later than fall of third year.
- 3
Pharmaceutical Science Colloquium (PHSC 6810) must be taken six months before dissertation defense.
- 4
Professional Development for Pharmaceutical Sciences (PHSC 5305) and Ethical Problems in Health Sciences Research (PHSC 6213) are suggested to be taken in the fourth year but can be taken at any point before graduation.

Advanced Entry Program Requirements

Advanced entry into the Pharmaceutics and Drug Delivery PhD program requires a master’s degree in pharmaceutical sciences or related area and focuses on various advanced research courses. An applicant’s transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

- Annual review
- Qualifying examination
- Dissertation committee
- Dissertation proposal
- Dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Required		
PHSC 6213	Ethical Problems in Health Sciences Research	2
Seminar		
Complete the following repeatable course for four times:		4
PHSC 6300	Pharmaceutical Science Seminar	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Research and Dissertation

Code	Title	Hours
Qualifying Examination		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	
PHSC 9991	Dissertation Term 2	

Program Credit/GPA Requirements

- 10 total semester hours required
- Minimum 3.000 GPA required

Plan of Study (Advanced Entry)

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 8940		1 PHSC 8986 or 9681 ¹		0 PHSC 9681 ¹	2
PHSC 6300		1 PHSC 6300		1	
		2		1	2
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0

PHSC 9990	0	PHSC 9991	0	
	1		1	0
Year 3				
Fall	Hours	Spring	Hours	
PHSC 6810 ²		1 PHSC 9996		0
PHSC 9996		0 PHSC 6213		2
	1		2	

Total Hours: 10

- ¹ Doctoral Proposal (PHSC 9681 (<https://catalog.northeastern.edu/search/?P=PHSC%209681>)) may be taken in spring of first year but must be taken before fall of second year.
- ² Pharmaceutical Science Colloquium (PHSC 6810 (<https://catalog.northeastern.edu/search/?P=PHSC%206810>)) must be taken six months before dissertation defense.

Pharmacology, PhD (Boston)

The pharmacology PhD enables students to specialize in the study of the actions of drugs and their effects in living systems. In addition to the opportunity for developing a sound knowledge base through coursework and seminars, the program is designed to strengthen students' ability to understand and evaluate critically current pharmacology literature, informing the students' independent laboratory research that advances our understanding of drugs, their actions, and their pharmacotherapeutic applications. Recent graduates with a pharmacology PhD have found employment in academic and industrial research positions.

Journal Club Participation

The Department of Pharmaceutical Sciences sponsors weekly journal clubs, Pharmaceutical Science Seminar (PHSC 6300), at which students present and evaluate current scientific literature in their fields of study. Students must attend one of these journal clubs (Pharmaceutics & Drug Delivery Journal Club, Pharmacology Journal Club, or Medicinal Chemistry & Drug Discovery Journal Club), chosen in consultation with their advisors.

Attendance at one of these journal clubs is required each and every academic semester, as an integral part of the PhD curriculum, with the exception of the last year (year four) in the program. All PhD students must participate full-time in journal club for course credit, Pharmaceutical Science Seminar (PHSC 6300), for six semesters. Failure to attend journal club regularly may result in sanctions such as probation or dismissal from the PhD program. Any student who does not comply with these (or any other) conditions required in the PhD program faces potential dismissal.

Colloquium Attendance

All PhD students, regardless of program, are required to attend the weekly Pharmaceutical Science Colloquium series. Announcements of times and locations will be distributed weekly to students by email to their university email addresses. Attendance is recorded by sign-up sheet. One excused absence is permitted per semester. Failure to attend colloquia may result in sanctions such as probation or dismissal from the PhD program.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in the pharmaceutical and biotechnology industries.

After PhD candidates have completed their dissertation research and are working on their dissertations, they are able, with the express permission of their PhD advisor, to participate in an internship if they choose. They are never allowed to intern while they are serving as teaching assistants.

1. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Students are responsible for tracking this experience on their resumés as there will be no detailed record on students' transcripts of these opportunities.
2. In order to be eligible for internship, students must take Professional Development for Pharmaceutical Sciences (PHSC 5305) a semester before internship.
3. Students must not accept more than one position. They must honor the first offer accepted. Any student not adhering to this requirement will not be allowed to participate.
4. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training authorization from the Office of Global Services (<https://international.northeastern.edu/ogs/>) every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the postgraduation benefit of Post-Completion Optional Practical Training.
5. In order to receive a grade for the course, students must write at least two learning goals within the first two weeks of the internship and a one- to two-page paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
6. Taking internship must not extend international students' visas.

7. There are no vacations on internships. Companies' sick time policies may vary. Students should check with their employers. For all other matters, please see the Universitywide Academic Policies and Procedures (p. 87) and/or Bouvé College of Health Sciences Academic Policies and Procedures (p. 772).

Milestones

QUALIFYING EXAMINATION

The PhD qualifying examination is required for students in all four programs under the auspices of the Department of Pharmaceutical Sciences: pharmacology, medicinal chemistry and drug discovery, biomedical sciences, and pharmaceuticals and drug delivery. Students from each of the four programs will take the exams within the same time frame (below), regardless of specialty-area program focus.

Doctoral students should have selected a dissertation advisor by the end of their first year in the program and are expected to have begun research and demonstrated initial proficiency in the laboratory before taking the PhD qualifying examination.

The PhD qualifying examination tests the candidates' knowledge and skills in core courses and program content areas. The overall PhD qualifying examination consists of two written exams and one oral exam. The qualifying examination is taken as a course, Doctoral Training and Research (PHSC 8940), no later than during the fall semester of the student's second year, after having successfully completed all the core courses of their respective programs.

At least two departmental faculty will contribute questions for the written exams, and no one faculty member will write more than the equivalent of one entire exam. All students qualified to sit for the exams are expected to take them at the times announced.

The format for the written exams may vary (e.g., faculty may ask a series of comprehensive essay questions or provide research publications(s) from the biomedical literature and ask questions based upon the publications' content). The first exam is given in the first week of fall semester, with the written portion of the second exam (i.e., the F31 written document) to be submitted to the student's exam committee by the end of October, with the oral presentation to be completed by mid-November and graded by the providers of the question(s).

- **Written exam 1** reflects students' knowledge of their specialty-area program material and of overall pharmaceutical sciences. This exam is given on the same day in two parts. Part 1 is focused on each student's specialty-area program focus. Part 2 will test students' overall knowledge in another program focus covered by the pharmaceutical sciences curriculum.
 - For example, if the student is in the pharmaceuticals and drug delivery PhD program, part 1 will be about pharmaceuticals and drug delivery, and part 2 can focus either on pharmacology or medicinal chemistry and drug discovery.
- **Written exam 2** requires that students write an NIH F31 grant proposal and have the proposal signed off as passing by their examination committee after an oral defense.

A score of at least 70% is required to pass the first written exam (two parts). Students must pass all written portions of the PhD qualifying examination prior to the oral defense of the F31 proposal. Students who fail one written exam will have one opportunity to retake and pass that examination. A student who fails the first exam twice will be required to withdraw from the PhD program.

During the oral exam, students defend their NIH F31 grant proposal before an examination committee of, minimally, four faculty members: the dissertation advisor, at least two other Department of Pharmaceutical Sciences faculty members, and at least one member from outside the department. This committee is convened only for the oral exam and does not need to be the same committee as the student's dissertation committee.

Members of the oral examination committee are selected by the student, after consultation with the dissertation advisor and/or the director of graduate studies. The oral exam is graded on a satisfactory/unsatisfactory basis. Students who fail the oral exam on the first attempt may retake the exam within a time period designated by the examination committee not to exceed two months from the first oral exam. Those who fail twice will be dismissed from the program.

DOCTORAL CANDIDACY STATUS

Doctoral students who have completed satisfactorily and thereby earned the credits for all required core courses (including those for their specialized area) and who have passed the written and oral qualifying examinations shall be admitted to candidacy status for the PhD degree.

DOCTORAL DISSERTATION COMMITTEE

Doctoral students must complete a dissertation that embodies the results of extended research and makes an original contribution to their field. This work should give evidence of candidates' abilities to conduct independent investigation and interpret the results of their research in a professional manner. The doctoral dissertation advisor serves as chairperson of the Doctoral Dissertation Committee, which consists of no fewer than five members. Selection of an advisor is by mutual consent of the student and a member of the faculty, with approval by the director of graduate studies in the Department of Pharmaceutical Sciences. At least two members of the Doctoral Dissertation Committee must be faculty members in the Department of Pharmaceutical Sciences. At least one member is to be selected from outside the department. Committee members are chosen for their expertise in students' research areas.

DISSERTATION PROPOSAL DEFENSE

Within a year after successful completion of the PhD qualifying examination, but no later than the beginning of the fall semester of the third year, students must prepare and defend a written proposal detailing their planned dissertation project. Failure to do so will be regarded as a failure to progress in the PhD program and will result in a warning from the director of graduate studies of the Department of Pharmaceutical Sciences.

Students who do not correct this deficiency within one semester will be placed on academic probation. Students on academic probation must complete the dissertation proposal defense and return to nonprobationary status within one semester or be dismissed from the PhD program.

The dissertation proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should otherwise conform to the format and structure of an NIH grant proposal with four main sections: specific aims, background and significance, preliminary studies, and experimental design and methods. The Department of Pharmaceutical Sciences "Dissertation Proposal" document provides detailed instructions on the preparation of a dissertation proposal. Associated required forms may be found in the School of Pharmacy and Pharmaceutical Sciences Student Portal on Canvas in the module section.

The dissertation proposal must be defended orally before the student's dissertation committee and signed by all dissertation committee members in *approval of the student's planned dissertation research*. Upon dissertation approval, the committee must sign the proposal approval cover sheet (<https://app.smartsheet.com/b/form/bd964901f0324ef4981d1673ab45b4c9/>), which is automatically submitted to the department's director of graduate studies and to the Bouvé College of Health Sciences Graduate Office.

BIANNUAL REVIEW

Dissertation committees meet routinely at six-month intervals, but no less than once a year, to evaluate students' research progress and to be presented with written and oral progress reports on the direction and status of the research. Progress reports should be written in a brief format, identical to that described for the formal dissertation (see instructions listed on the SOPPS Student Portal Canvas site). Unsatisfactory productivity provides the basis for a warning by the dissertation committee and/or the Graduate Committee. Two such warnings will result in a student's dismissal from the program.

Registration for Dissertation

Advisor consent and completion of all coursework (with the exception of the colloquium course) must be documented before students register for the first dissertation course. Students must register for Dissertation Term 1 (PHSC 9990) and Dissertation Term 2 (PHSC 9991). Students must register for Dissertation Continuation (PHSC 9996) each semester thereafter until the dissertation has been successfully defended. The department strongly encourages PhD students to complete the program within five years after acceptance, i.e., by three years after establishing degree candidacy. According to university policy, no PhD students may remain in the program for more than seven years.

Publications and Presentations

Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

PhD Dissertation Preparation

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found on the SOPPS Student Portal Canvas site. The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

PHARMACEUTICAL SCIENCES COLLOQUIUM

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

ORAL DISSERTATION DEFENSE

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

The dissertation committee conducts the final defense. The committee may recommend that the student clarify, amplify, or rewrite portions of the dissertation *before the final defense is scheduled*. Once the committee concurs that that written dissertation document is acceptable, a date is chosen for the final oral examination.

At least two weeks prior to the defense, students should inform the director of graduate studies in the Department of Pharmaceutical Sciences of the date of defense, so that advance announcement may be distributed. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student in a seminar format, and responses to audience and committee questions, the committee meets first with the student for any follow-up discussion and then in executive session to decide whether the student has defended the dissertation successfully.

The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

Deadline

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

SOPPS CODE OF PROFESSIONAL CONDUCT

All SOPPS students (BSPS, Preprofessional, MS, and PhD) are expected to adhere to the Code of Professional Conduct (<https://bouve.northeastern.edu/assets/uploads/sites/5/2021/10/northeastern-school-of-pharmacy-code-of-professional-conduct-2021.pdf>).

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
 Doctoral candidacy status
 Doctoral dissertation committee
 Dissertation proposal
 Biannual review
 Pharmaceutical Sciences Colloquium
 Oral dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Seminar		
Complete the following repeatable course for six semesters:		6
PHSC 6300	Pharmaceutical Science Seminar	
Required Core		
Complete the following courses:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5305	Professional Development for Pharmaceutical Sciences	1
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 6214	Experimental Design and Biostatistics	2
Pharmacology		
PMCL 6250	Ion Channel Physiology and Pharmacology	3
PMCL 6252	Small-Molecule Target and Ligand Pharmacology	4

Research & Dissertation

Code	Title	Hours
Pre-Qualifying Exam Course		
PHSC 7020	Scientific Writing: Thesis Proposal	2
Qualifying Exam		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	
PHSC 9991	Dissertation Term 2	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Program Credit/GPA Requirements

30 total semester hours required
Minimum 3.000 GPA required

Plan of Study (Standard Program)

Sample Plan

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 5100		2 PHSC 5212		2 PHSC 7020 ¹	2
PHSC 5102		2 PHSC 6214		2	
PMCL 6250		3 PHSC 6300		1	
PHSC 6300		1 PMCL 6252		4	
		8		9	2
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 ²	2
PHSC 8940		1 PHSC 8986		0	
		2		1	2
Year 3					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0
Year 4					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 5305 ⁴		1 PHSC 6213 ⁴		2 PHSC 9996	0
PHSC 6810 ³		1 PHSC 9996		0	
		2		2	0
Total Hours: 30					

- ¹ Scientific Writing: Thesis Proposal (PHSC 7020) must be taken the summer before the qualifying exams.
² Doctoral Proposal (PHSC 9681) should be taken in summer of second year, but no later than fall of third year.
³ Pharmaceutical Science Colloquium (PHSC 6810) must be taken six months before dissertation defense.
⁴ PHSC 5305 & PHSC 6213 are suggested to be taken in the fourth year, but can be taken at any point before graduation.

Advanced Entry Program Requirements

Advanced entry into the PhD in Pharmacology requires a master's degree in pharmaceutical sciences or a related area and focuses on various advanced research courses and successful defense of the dissertation. An applicant's transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Qualifying examination
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Required		
PHSC 6213	Ethical Problems in Health Sciences Research	2
Seminar		

Complete the following repeatable course four times: 4

PHSC 6300	Pharmaceutical Science Seminar	
Colloquium		
PHSC 6810	Pharmaceutical Science Colloquium	1

Research & Dissertation

Code	Title	Hours
Qualifying Examination		
PHSC 8940	Doctoral Training and Research	1
Proposal Preparation		
PHSC 9681	Doctoral Proposal	2
Dissertation		
PHSC 9990	Dissertation Term 1	
PHSC 9991	Dissertation Term 2	

Program Credit/GPA Requirements

10 total semester hours required

Minimum 3.000 GPA required

Plan of Study (Advanced Entry)

Sample Plan - Advanced Entry

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 ¹	2
PHSC 8940 ¹		1 PHSC 8986 or 9681 ¹		0	
		2		1	2
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0
Year 3					
Fall	Hours	Spring	Hours		
PHSC 6810 ²		1 PHSC 6213		2	
PHSC 9996		0 PHSC 9996		0	
		1		2	
Total Hours: 10					

¹ Doctoral Proposal (PHSC 9681 (<https://catalog.northeastern.edu/search/?P=PHSC%209681>)) may be taken in spring of first year but must be taken before fall of second year.

² Pharmaceutical Science Colloquium (PHSC 6810 (<https://catalog.northeastern.edu/search/?P=PHSC%206810>)) must be taken six months before dissertation defense.

Pharmacy, PharmD (Boston)

Program requirements that follow relate to the final year of the six-year Doctor of Pharmacy (PharmD) program only. For information regarding years one through five of this program, please see the *Undergraduate Catalog* Doctor of Pharmacy (Pharmacy, PharmD) webpage.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Complete 36 semester hours in the following range:		36
PHMD 6440 to PHMD 6474		

Program Credit/GPA Requirements

36 total semester hours required
Minimum 3.000 GPA required

Pharmacy, PharmD—Direct Entry (Boston)

The School of Pharmacy and Pharmaceutical Sciences (SOPPS) offers the Doctor of Pharmacy degree (PharmD). The direct-entry admission pathway for this program requires that students complete a BS or BA from an accredited institution with a preferred prerequisite grade-point average of 3.000. Only grades of C (2.000) or higher are acceptable to fulfill a prerequisite course. The following prerequisite courses and credits are required:

Requirements	Credits
Chemistry 1 and 2 (1 lab)	7
General biology 1 and 2 (1 lab)	7
Calculus (or higher-level math)	3
Organic chemistry 1 and 2 (w/labs)	8
Biochemistry	3
Anatomy and Physiology 1 and 2	7
Arts/humanities/social studies	4

Direct entry into the first professional year of the PharmD program offers students a four-year graduate course of study that fully integrates campus-based learning with experiential learning, including Northeastern University's signature cooperative education program, to provide students with the knowledge, skills, and abilities necessary to succeed in the pharmacy profession. Our students promote and ensure the safe and effective use of drugs and provide medication therapy management services. In addition to preparing and dispensing prescribed medications, our students provide information to patients about medications and their uses; advise physicians, other prescribers, and other healthcare practitioners on medication selection, dosages, interactions, and adverse effects; and monitor patient responses to drug therapy.

Our students are well equipped to provide patient care services in a variety of settings. Most of our graduates work in community pharmacies or in healthcare facilities such as hospitals and ambulatory clinics. Additional practice opportunities exist in health maintenance organizations, private practice groups, long-term-care facilities, home healthcare, the Public Health Service, the armed services, and law enforcement and regulatory agencies such as the Federal Drug Administration or Drug Enforcement Administration. Graduates may also find employment in drug development, marketing and research within the pharmaceutical industry, colleges of pharmacy, and professional association management. In addition, many of our graduates go on to pharmacy practice residencies, fellowships, and leading graduate programs.

PharmD students are admitted with the expectation that by working with faculty, staff, and each other, they will develop the knowledge, skills, and attitudes necessary for academic and professional success. Students follow academic progression plans for their respective years of graduation. Any deviation from the prescribed curriculum will require faculty/staff permission and an approved plan of study from the SOPPS Academic and Professional Standing Committee.

The curriculum includes both Introductory Pharmacy Practice Experiences (IPPEs, fulfilled with co-op) and Advanced Pharmacy Practice Experiences (APPEs). These pharmacy practice experiences (PPEs) are provided primarily under the direct supervision of qualified pharmacist preceptors and occasionally with other qualified healthcare professionals. The school is affiliated with many world-class practice sites throughout the United States, providing students with access to experienced clinicians and scholars. Although every effort is made to accommodate individual circumstances and requests, students should be prepared to travel outside the Boston area to complete some of their PPEs. Availability of a car may be required, as some sites are not accessible by public transportation. All expenses associated with PPEs, including travel and housing, are the responsibility of the student.

IPPEs are competitive placements that are based on job availability in a geographic region. The placements are facilitated by SOPPS-designated Bouvé co-op education coordinators. Students are required to earn satisfactory (S) grades in both IPPEs. One will meet ACPE-based IPPE requirements, while the second IPPE will be selected by the student from all available positions.

APPE placements are provided based on site/preceptor availability and the final approval of the SOPPS Office of Experiential and Continuing Professional Education (OECPE). Students may be able to petition the OECPE for special-arrangement APPEs; however, availability for such requests is limited.

To be eligible for the PharmD degree, a student must successfully complete all courses in the curriculum, including the IPPEs (co-ops) and APPEs; meet the academic progression standards of the program; meet the technical standards of the program; and satisfy all other requirements as stated. The pharmacy program is fully accredited by the Accreditation Council for Pharmacy Education (<https://www.acpe-accredit.org/>) (ACPE) and adheres to the standards established by ACPE.

Pharmacy graduates must meet specific requirements to qualify for professional licensure in the state where they plan to practice as a registered pharmacist. These requirements include graduating from an accredited school of pharmacy, passing national and state board examinations, and completing internship hours. The internship is a period of practical experience conducted under the supervision of a registered pharmacist. Massachusetts requires 1,500 internship hours, all of which are satisfied through completion of IPPEs (co-op) and APPEs.

Professional and/or legal exigencies arise from time to time, which may necessitate changes in a pharmacy course, progression, and/or graduation requirements. Students should review their status with academic advisors on a timely basis and refer to current publications for updated information.

Requirements for the PharmD Pharmacy PPEs

Requirements for the successful completion of the PharmD PPEs include:

1. Evidence of health clearance from University Health and Counseling Services before placements at any PPE site.
2. Satisfactory completion of any additional site-specific requirements including, but not limited to, criminal record information (CORI), urine drug screens, and verification of immunization status. All fees associated with these requirements are the responsibility of the student.

Management of Positive Urine Drug Screens

If the student learns the urine drug screen (test #1) is positive (+), the student will notify the OECPE (pharmacyoe@northeastern.edu) and immediately complete a second urine screen (test #2). A professional concern form will be completed based on test #1 results and reported to the university's Office of Student Conduct and Conflict Resolution (OSCCR) via the Incident Report form (IRF).

If urine screen test #2 is negative (-), the student will be allowed to continue the PPEs. However, the student will be asked to complete a random urine screen (test #3) at a time determined by the OECPE. If this urine screen (test #3) is positive, the student will be administratively removed from the active PPEs and graduation may be delayed. A second professional concern form will be completed, based on test #3 results. The return to PPEs will occur once a repeat urine test is negative. That repeat negative test will be followed up by a random urine screen at a time determined by the OECPE.

If the urine screen (test #2) is positive, the student will be administratively removed from the PPEs and graduation may be delayed. The return to PPEs will occur once a repeat urine screen is negative. That negative screen will be followed up by a random urine screen at a time determined by the OECPE. A second professional concern form and OSCCR IRF will be completed based on a positive test #3 result.

3. Adherence to the school's code of professional conduct and university's code of conduct policies while off-campus.
4. Maintenance of an active pharmacy intern license in every state where the student completes a PPE.
5. Compliance with site-specific requirements (via site descriptions) and completion of site requests within specified deadlines. Students who fail to complete these requirements as directed will likely incur grade penalties and may experience a delay of graduation or dismissal from the PharmD program.

PROGRAM POLICIES

Students are expected to adhere to the policies and standards of their program major as stated to progress through their curriculum as planned. Students seeking any exceptions to the program policies and standards specified for their program major must present a petition before the SOPPS Academic and Professional Standing Committee.

Given programmatic requirements, coupled with concerns over the loss of therapeutic knowledge, requests for a General Leave of Absence (<https://catalog.northeastern.edu/graduate/academic-policies-procedures/policies/>), other than Medical or Emergency Leave of Absence:

- Must comply with all stated Northeastern general policies, regardless of the academic year.
- May be made at any time period during the P1 or P2 years.
- During the P3 academic year, any request for a general leave must be made no later than February 1 of the given academic year. Requests after this date will not be permitted.
- During the P4 academic year, requests for a general leave cannot be made at any time.

Students are eligible to begin APPEs following successful completion of all didactic coursework. Completing didactic coursework during P4 year is prohibited.

SOPPS PROFESSIONAL CODE OF CONDUCT

All SOPPS students (i.e., preprofessional PharmD, Pharmaceutical Sciences, BS, P1–P4 PharmD, MS, PhD) are expected to adhere to the SOPPS—Professional Code of Conduct (<https://bouve.northeastern.edu/assets/uploads/sites/5/2021/10/northeastern-school-of-pharmacy-code-of-professional-conduct-2021.pdf>).

TECHNICAL STANDARDS FOR THE DOCTOR OF PHARMACY PROGRAM

The PharmD program at Northeastern is a rigorous and challenging academic program that requires students to possess specific characteristics and abilities within the cognitive, affective, and psychomotor domains, referred to here as technical standards. To successfully progress in and ultimately complete the didactic, laboratory, and experiential components of the PharmD program, students must meet the standards described below.

Intellectual Abilities

Students must have well-developed problem-solving and critical-thinking skills. Cognitive function must be appropriate to integrate, evaluate, and apply information gained through measurement, analysis, calculation, and reasoning. Students must have the capacity to learn efficiently in classroom, laboratory, small group and experiential settings, and through independent study. Students are required to demonstrate the ability to integrate course content knowledge with clinical practice applications to optimize medication therapy management.

Communication Skills

Students must be able to communicate effectively with colleagues, professors, patients, families, and healthcare providers. This includes efficiently comprehending, speaking, reading, and writing in English. Students must be able to process and use appropriate nonverbal cues and be proficient in the use of electronic communication media.

Behavioral and Social Attributes

Students must demonstrate professionalism, maturity, integrity, honesty, compassion, and respect when relating to others. Students must have sufficient mental and emotional health to complete work and responsibilities using good judgment. Students must be able to tolerate and adapt to stressful workloads and situations and modify behavior based on constructive criticism. Students must be able to function in accordance with the legal, ethical, and professional standards of practice.

Observation and Motor Skills

Students must have functional use of visual, auditory, and tactile senses. Students must be able to observe and perform experiments, physical assessments, patient interviews, and medication order processing. Students must be able to distinguish physical characteristics of medications by inspection. Students must have coordination of gross and fine muscular movements sufficient to perform pharmacy-related tasks including compounding and dispensing medications, administering medications, and using computers and other technology necessary for learning and professional practice.

ACADEMIC DISMISSAL FROM MAJOR

PharmD students in the Bouvé College of Health Sciences will be dismissed from their major effective the following academic semester for any of the reasons noted below:

- Failure to earn a grade of C or better in three professional courses, regardless of remediation. Within the PharmD program, each specific professional course (with separate registration number) will be counted as a separate failure even if content is related.
- Failure to earn the minimum required grade in the same course twice.
- Failure to maintain a GPA of 3.000 after two semesters of probation.
- The expected graduation date may not change more than twice.

The PharmD program monitors and promotes the development of professional behaviors in its students in order to ensure appropriate professionalism in the classroom, local and global communities, and clinical settings. Breach of adherence to these standards may result in dismissal from the program.

ACADEMIC APPEALS

Students who believe that they were erroneously, capriciously, or otherwise unfairly treated in an academic or cooperative education decision may petition to appeal the decision. Refer to the Bouvé College of Health Sciences Academic Affairs Appeals Process (<https://catalog.northeastern.edu/graduate/health-sciences/academic-policies-procedures/appeals-process/>) and the Northeastern University Academic Appeals Policies and Procedures (<https://catalog.northeastern.edu/undergraduate/academic-policies-procedures/academic-appeals-policies-procedures/>).

PROGRAM STUDENT LEARNING OUTCOMES

Please visit Bouvé College Program Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Pharmacy Major (PharmD) Grade and Progression Requirement

To progress into the subsequent semester of professional courses, students must receive a grade of C or better in all PHMD and PHSC courses, as well as in any course completed to fulfill the professional elective requirement.

For PharmD students, an unsatisfactory grade (U) in a co-op will be counted as a professional course deficiency.

Students who incur an incomplete grade in a prerequisite course may not progress into the subsequent courses(s). Any exceptions will be determined by protocols established by the program, after consultation with the student's academic advisor.

Core Requirements

Code	Title	Hours
YEAR 1		
PHMD 5115	Integrated Science and Therapeutics 2	4
PHMD 5120	Principles of Pharmacy Practice	4
PHMD 5140	Integrated Social and Administrative Sciences 1	4
PHMD 5182	Integrated Learning Lab 2	1
PHMD 5191	Concepts in Practice 1	1
PHMD 5192	Concepts in Practice 2	1
PHMD 6964	Co-op Work Experience (Introductory Pharmacy Practice Experience) ¹	0

PHSC 5110	Integrated Science and Therapeutics 1	4
PHSC 5130	Foundations of Pharmaceutical Sciences 1	4
PHSC 5181	Integrated Learning Lab 1	1
YEAR 2		
PHMD 5210	Integrated Science and Therapeutics 4	4
PHMD 5215	Integrated Science and Therapeutics 5	4
PHMD 5220	Integrated Science and Therapeutics 6	4
PHMD 5240	Integrated Social and Administrative Sciences 2	4
PHMD 5245	Integrated Social and Administrative Sciences 3	4
PHMD 5283	Integrated Learning Lab 3	1
PHMD 5284	Integrated Learning Lab 4	1
PHMD 5285	Integrated Learning Lab 5	1
PHMD 5293	Concepts in Practice 3	1
PHMD 5294	Concepts in Practice 4	1
PHMD 5295	Concepts in Practice 5	1
PHSC 5205	Integrated Science and Therapeutics 3	4
PHSC 5230	Foundations of Pharmaceutical Sciences 2	4
YEAR 3		
PHMD 5320	APPE Readiness	4
PHMD 5335	Integrated Science and Therapeutics 7	4
PHMD 5345	Integrated Social and Administrative Sciences 4	4
PHMD 5386	Integrated Learning Lab 6	1
PHMD 5396	Concepts in Practice 6	1
PHMD 6964	Co-op Work Experience (Introductory Pharmacy Practice Experience) ¹	0
YEARS 3 and 4		
Complete 36 semester hours of Advanced Pharmacy Practice Experience (APPE) from the following:		36
PHMD 6440	Internal Medicine Advanced Pharmacy Practice Experience	
PHMD 6441	Acute Care Advanced Pharmacy Practice Experience	
PHMD 6442	Ambulatory Care Advanced Pharmacy Practice Experience	
PHMD 6443	Community Advanced Pharmacy Practice Experience	
PHMD 6445	Ambulatory Care Elective Advanced Pharmacy Practice Experience	
PHMD 6446	Psychiatry Advanced Pharmacy Practice Experience	
PHMD 6447	Community Elective Advanced Pharmacy Practice Experience	
PHMD 6448	Long-Term Care Advanced Pharmacy Practice Experience	
PHMD 6449	Geriatrics Advanced Pharmacy Practice Experience	
PHMD 6450	Pediatrics Advanced Pharmacy Practice Experience	
PHMD 6451	Neonatology Advanced Pharmacy Practice Experience	
PHMD 6452	Critical Care Advanced Pharmacy Practice Experience	
PHMD 6453	Surgery Advanced Pharmacy Practice Experience	
PHMD 6454	Cardiology Advanced Pharmacy Practice Experience	
PHMD 6456	Drug Information Advanced Pharmacy Practice Experience	
PHMD 6457	Oncology Advanced Pharmacy Practice Experience	
PHMD 6461	Infectious Disease Advanced Pharmacy Practice Experience	
PHMD 6462	Pharmacy Industry Advanced Pharmacy Practice Experience	
PHMD 6463	Pharmacy Administration Advanced Pharmacy Practice Experience	
PHMD 6464	Regulatory Advanced Pharmacy Practice Experience	
PHMD 6465	Managed Care Advanced Pharmacy Practice Experience	
PHMD 6466	Transplantation Advanced Pharmacy Practice Experience	
PHMD 6467	Directed Practice Advanced Pharmacy Practice Experience	
PHMD 6469	Management Advanced Pharmacy Practice Experience	
PHMD 6470	Education Advanced Pharmacy Practice Experience	
PHMD 6471	Research 1 Advanced Pharmacy Practice Experience	

¹ For pharmacy students, an unsatisfactory grade (U) in a co-op will be counted as a professional course deficiency.

Elective Requirements

Code	Title	Hours
Open Electives		
A minimum of 8 semester hours of open electives is required.		8
Professional Electives		
Complete at least 2 semester hours from the following:		2
CAEP 6203	Understanding Culture and Diversity	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5102	Data Management in Healthcare	
HINF 5300	Personal Health Interface Design and Development	
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6404	Patient Engagement Informatics and Analytics	
HLTH 5002	Mindfulness: Theory and Practice	
HLTH 5200	Illusions, the Brain, and Healthcare	
HLTH 5280	The (in)Visibility of (dis)Ability in Society	
HLTH 5310	Introduction to Transgender Perspectives in Healthcare	
HLTH 5600	Introduction to Patient Safety	
HLTH 5700	Social Determinants of Health	
HLTH 5800	AI Across the Health Sciences	
HSCI 5130	Introduction to Real-World Evidence	
HSCI 5140	Foundations of Data Models	
HSCI 5150	Methods for Observational Research 1	
HSCI 5151	Methods for Observational Research 2	
HSCI 5160	Standardization of Real-World Data	
HSCI 5170	Data Model Transformation	
HSCI 5180	Phenotyping	
HSCI 5190	Cohort Building	
HSCI 6110	Advanced Population Characterization	
HSCI 6120	Advanced Population Estimation	
HSCI 6130	Advanced Patient Prediction	
MSCI 5001	Human Factors and Situational Awareness	
MSCI 5002	Crisis Resource Management and Case Studies	
MSCI 5003	Humanitarian Aid Practice and Principles	
MSCI 5004	Humanitarian and Disaster Response Ethics	
MSCI 5005	Care During Conflict	
PHMD 4350	Exploring Academic Careers	
PHMD 4585	Research Methods in Health Systems	
PHMD 4700	Principles in General Medicine	
PHMD 4890	Contemporary Issues in Geriatric Pharmacy	
PHMD 5223	Evidence-Based Medicine	
PHMD 5575	Pharmaceutical Industry	
PHMD 5976	Directed Study	
PHMD 5984	Research	
PHSC 5100	Concepts in Pharmaceutical Science	
PHSC 5212	Research Skills and Ethics	
PHSC 5400	Principles of Drug Design	
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies	
PHSC 5555	Pharmaceutical Toxicology	

PHSC 5976	Directed Study
PHSC 5984	Research
PHSC 6222	The Chemistry and Biology of Drugs of Abuse
PHSC 6224	Behavioral Pharmacology and Drug Discovery
PHSC 6290	Biophysical Methods in Drug Discovery
PHTH 5222	Health Advocacy
PHTH 5226	Management and Leadership in Public Health and Healthcare
PHTH 5230	Global Health
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy
PHTH 5300	Project Management in Public Health
PHTH 5310	Budget Principles in Public Health
PHTH 5320	Grant Writing in Public Health
PHTH 6320	Qualitative Methods in Health and Illness
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems

Program Credit/GPA Requirements

118 total semester hours required

Minimum 3.000 GPA required

Plan of Study

Sample Plan of Study

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Professional Year 1 (P1)		Professional Year 1 (P1)		Professional Year 1 (P1)		Professional Year 1 (P1)	
PHMD 5120	4	PHMD 6964 (IPPE)	0	PHMD 6964	0	PHMD 5115	4
PHMD 5140	4					PHMD 5182	1
PHMD 5191	1					PHMD 5192	1
PHSC 5110	4					Elective	2-4
PHSC 5130	4						
PHSC 5181	1						
	18		0		0		8-10
Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Professional Year 2 (P2)		Professional Year 2 (P2)		Professional Year 2 (P2)		Professional Year 2 (P2)	
PHMD 5240	4	PHMD 5210	4	PHMD 5220	4	PHMD 6964	0
PHMD 5283	1	PHMD 5215	4	PHMD 5285	1		
PHMD 5293	1	PHMD 5245	4	PHMD 5295	1		
PHSC 5205	4	PHMD 5284	1	Elective	2-4		
PHSC 5230	4	PHMD 5294	1				
Elective	2-4	Elective	2-4				
	14-16		14-16		6-8		0
Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Professional Year 3 (P3)		Professional Year 3 (P3)		Professional Year 4 (P4)		Professional Year 4 (P4)	
PHMD 6964	0	PHMD 5320	4	APPE (choose from PHMD 6440–PHMD 6474)	6	APPE (choose from PHMD 6440–PHMD 6474)	6
		PHMD 5335	4				
		PHMD 5345	4				
		PHMD 5386	1				
		PHMD 5396	1				

Elective		2-4			
0		14-16		6	
Year 4					
Fall	Hours	Spring	Hours		
APPE (choose from PHMD 6440-PHMD 6474)	6	APPE (choose from PHMD 6440-PHMD 6474)	6		
APPE (choose from PHMD 6440-PHMD 6474)	6	APPE (choose from PHMD 6440-PHMD 6474)	6		
12		12			

Total Hours: 110-120

Biomedical Science, MS (Boston)

The science and research surrounding human health and disease are becoming more interdisciplinary. In response to this trend, the biomedical science MS program allows students to focus on areas across the biomedical sciences to gain training in human (patho)physiology and the application of existing and potential therapeutic approaches to treat disease. The Master of Science in Biomedical Science curriculum is particularly appropriate both for those entering as well as those currently employed in the field, including research technicians, clinical laboratory workers, science teachers, and science administrators. For those currently employed, the program can enhance performance in a present position or open new employment opportunities. Graduates of the program will be well prepared to enter related PhD programs at the university.

Curriculum Requirements

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis and may include an optional research thesis. International students are required to attend the program on a full-time basis.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average of 3.200 or better; be in good academic and professional standing (i.e., have no Professionalism Concern forms filed); and have no instances of academic dishonesty or blocks on enrollment.
2. In order to be eligible for internship, students must take the Professional Development for Pharmaceutical Sciences (PHSC 5305) course in either the fall or spring semester of their first year.
3. Students are in school full-time in addition to working on their internships.
4. There are no vacations on internships. Companies' sick time policies may vary. Students should check with their employers.
5. Students are responsible for finding their own internship and must be honest and accurate in representing their experiences on their resumés. Prior to looking for an internship, students must have their faculty advisor approve their resumé and ascertain to the best of their ability that the skills and training of students are as presented.
6. Students must not accept more than one position. They must honor the first offer accepted.
7. In order to receive a grade for the course, students must write at least two learning goals and a paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
8. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training authorization from the Office of Global Services every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the postgraduation benefit of Post-Completion Optional Practical Training.
9. Students receive 1 academic credit per semester for Pharmaceutical Science Internship (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for Pharmaceutical Science Internship (PHSC 6401). The 4th credit for Pharmaceutical Science Internship (PHSC 6401) will not be added to the student's degree.
10. Taking internship must not extend international students' visas.

General Policies Common to All MS Programs in the Department of Pharmaceutical Sciences

GRADING POLICY

Students are expected to maintain a GPA of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the

MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p.) and Academic Probation Policy (p.) for full details.

PROGRESSION REQUIREMENT

Bouvé College of Health Sciences policy specifies that students register for coursework or continuation credit each semester of the academic year (fall and spring semesters) after they are matriculated as full- or part-time students. Moreover, international students are required to maintain full-time student status during each academic term; consult the Office of Global Services (<https://international.northeastern.edu/ogs/>) for specific requirements. Domestic students who are not able to register for courses during a particular semester must petition the director of graduate studies in the department for exemption in writing and state the reasons for the exemption and their plan for resuming their studies. Approval of the petition will preserve student status in the MS program.

All MS students are expected to complete the degree requirements within two years if enrolled on a full-time basis, or within three to five years if enrolled on a part-time basis. If progress toward the degree is slowed or interrupted for personal reasons, the student so affected must petition the School of Pharmacy and Pharmaceutical Sciences Academic Standing Committee for an extension, detailing the anticipated time to completion. If an extension is approved, the student will be directed to meet with the graduate program director to devise a formal plan to achieve completion of the degree.

Course credits earned in the Bouvé College of Health Sciences Graduate School or accepted for transfer from another institution and not applied to obtain a previous degree are valid for a maximum of seven years. Refer to the Bouvé College of Health Sciences Academic Progression policies and procedures (p.) for details.

ACADEMIC HONESTY AND RESEARCH INTEGRITY

The Department of Pharmaceutical Sciences has a zero-tolerance policy regarding academic dishonesty and violations of research integrity. It is each student's responsibility to understand and adhere to the SOPPS Code of Professional Conduct (<https://catalog.northeastern.edu/graduate/health-sciences/academic-policies-procedures/code-conduct-sopps/>) and to Northeastern University's Academic Integrity Policy (p. 88). Definitions of plagiarism, cheating, fabrication, falsification, unauthorized collaboration, and actions that facilitate academic or research dishonesty can be found on the Office of Student Conduct and Conflict Resolution website (<https://osccr.sites.northeastern.edu/>). The lack of knowledge of these definitions does not excuse the student's responsibility for upholding them. Offenses of academic honesty and research integrity are egregious violations of ethical standards and may result in disciplinary actions, including the student's immediate dismissal from the graduate program.

SCHOOL OF PHARMACY AND PHARMACEUTICAL SCIENCES CODE OF PROFESSIONAL CONDUCT

All SOPPS students (BS Pharmaceutical Sciences, Preprofessional, MS, and PhD) are expected to adhere to the SOPPS Code of Professional Conduct.

MASTER OF SCIENCE THESIS OPTION

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the student's abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS student research positions and the specific research focus.

Thesis Registration

Students may receive a maximum of 4 semester hours of credit for MS thesis research. Students should register for Thesis (PHSC 6990), twice for 2 semester hours each during the fall and spring semesters of their second full year of study, or after completing 15 credits of study. If completion of the thesis requires additional time, students should register for Thesis Continuation (PHSC 6996)(0 SH).

Thesis Committee

Each student's thesis committee should be composed of at least three members: two from the sponsoring program and one from outside the student's program. The outside member may be a Northeastern faculty member. The director of graduate studies for the pharmaceutical sciences department may appoint additional members, as considered necessary for student development. The student's major advisor, in whose laboratory the research is being conducted, will serve as committee chair. The student, after consulting with the committee chair, is responsible for calling all thesis committee meetings.

Thesis Proposal

The thesis proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should conform to the format and structure of an NIH grant proposal with four sections: specific aims, background and significance, preliminary studies, and experimental design and methods. See the Department of Pharmaceutical Sciences "Thesis Proposal" document for detailed instructions on the preparation of a thesis proposal and the required forms located in the SOPPS Student Portal on Canvas in the module section.

The thesis proposal must be defended orally before the thesis committee and verbally agreed on by all thesis committee members before the student undertakes the planned research. Once approved by the committee, the student should inform the director of graduate studies.

Thesis Final Defense

The final defense is taken after the student completes the thesis research and all other requirements for the MS degree. The defense deals with the subject matter of the thesis, significant developments in the field, and the student's background knowledge in their field of specialization. The thesis committee conducts the final defense.

At least two weeks prior to the expected date of the oral defense, the written thesis must be circulated to the student's thesis committee. After initial committee evaluation, recommendation may be made that the student clarify or rewrite portions of the thesis before scheduling the final defense. After the thesis committee concurs that the thesis is acceptable, a date is chosen for the final oral examination. At least two weeks prior to the defense, the student should inform the director of graduate studies in the pharmaceutical sciences department so that an announcement can be distributed to faculty and students. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student, and responses to audience and committee questions, the student's committee meets in executive session to decide whether the student has successfully defended the thesis. The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and the thesis is signed off and passed on to the director of graduate studies in the department. Requests for a second defense are unusual but may be permitted if the original oral defense was judged significantly inadequate.

Thesis Deadline

The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Required Core		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
or PHSC 6213	Ethical Problems in Health Sciences Research	
PHSC 5300	Pharmaceutical Biochemistry ¹	2 or 4
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology	2
PHSC 6214	Experimental Design and Biostatistics	2
PHSC 6216	Human Physiology and Pathophysiology	2

Electives

Code	Title	Hours
Complete 17–19 semester hours in the following subject areas: ¹		17-19
PHSC, PMCL, PMST, BIOL, CHEM, NNMD, BIOT		

Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Complete the following (repeatable) course twice:		4
PHSC 6990	Thesis	2
The following course may be taken if additional time is needed to complete the thesis:		
PHSC 6996	Thesis Continuation	

¹ Students who opt to complete 4-credit Pharmaceutical Sciences Laboratory (PHSC 7010) in the core requirements may complete the degree with 17 elective credits; all other students must complete 19 elective credits.

Program Credit/GPA Requirements

33 total semester hours required

Minimum 3.000 GPA required

Medicinal Chemistry and Drug Discovery, MS (Boston)

The Medicinal Chemistry & Drug Discovery MS program integrates aspects of contemporary medicinal chemistry and pharmacology, emphasizing topics most relevant to therapeutics design, discovery, and action. The core curriculum focuses on a combination of synthetic organic

chemistry, bioorganic chemistry, analytical chemistry, and pharmacology courses. Specialized, in-depth electives are offered in these areas. The program is designed to develop students' knowledge of medicinal chemistry through design, synthesis, and pharmacological profiling of novel pharmacotherapeutics as applied to helping solve unmet medical needs. For this purpose, many program graduates have established research careers in the pharmaceutical/biotech industry. Undergraduate prerequisites are general chemistry, organic chemistry, and biochemistry or cell/molecular biology.

Curriculum Requirements

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis and may include an optional research thesis. International students are required to attend the program on a full-time basis.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average of 3.200 or better; be in good academic and professional standing (i.e., have no Professionalism Concern forms filed); and have no instances of academic dishonesty or blocks on enrollment.
2. In order to be eligible for internship, students must take the Professional Development for Pharmaceutical Sciences (PHSC 5305) course in either the fall or spring semester of their first year.
3. Students are in school full-time in addition to working on their internships.
4. There are no vacations on internships. Companies' sick time policies may vary. Students should check with their employers.
5. Students are responsible for finding their own internship and must be honest and accurate in representing their experiences on their resumés. Prior to looking for an internship, students must have their faculty advisor approve their resumé and ascertain to the best of their ability that the skills and training of students are as presented.
6. Students must not accept more than one position. They must honor the first offer accepted.
7. In order to receive a grade for the course, students must write at least two learning goals and a paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
8. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training authorization from the Office of Global Services every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the postgraduation benefit of Post-Completion Optional Practical Training.
9. Students receive 1 academic credit per semester for Pharmaceutical Science Internship (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for Pharmaceutical Science Internship (PHSC 6401). The 4th credit for Pharmaceutical Science Internship (PHSC 6401) will not be added to the student's degree.
10. Taking internship must not extend international students' visas.

General Policies Common to All MS Programs in the Department of Pharmaceutical Sciences

GRADING POLICY

Students are expected to maintain a GPA of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p.) and Academic Probation Policy (p.) for full details.

PROGRESSION REQUIREMENT

Bouvé College of Health Sciences policy specifies that students register for coursework or continuation credit each semester of the academic year (fall and spring semesters) after they are matriculated as full- or part-time students. Moreover, international students are required to maintain full-time student status during each academic term; consult the Office of Global Services (<https://international.northeastern.edu/ogs/>) for specific requirements. Domestic students who are not able to register for courses during a particular semester must petition the director of graduate studies in the department for exemption in writing and state the reasons for the exemption and their plan for resuming their studies. Approval of the petition will preserve student status in the MS program.

All MS students are expected to complete the degree requirements within two years if enrolled on a full-time basis, or within three to five years if enrolled on a part-time basis. If progress toward the degree is slowed or interrupted for personal reasons, the student so affected must petition the School of Pharmacy and Pharmaceutical Sciences Academic Standing Committee for an extension, detailing the anticipated time to completion. If an extension is approved, the student will be directed to meet with the graduate program director to devise a formal plan to achieve completion of the degree.

Course credits earned in the Bouvé College of Health Sciences Graduate School or accepted for transfer from another institution and not applied to obtain a previous degree are valid for a maximum of seven years. Refer to the Bouvé College of Health Sciences Academic Progression policies and procedures (p.) for details.

ACADEMIC HONESTY AND RESEARCH INTEGRITY

The Department of Pharmaceutical Sciences has a zero-tolerance policy regarding academic dishonesty and violations of research integrity. It is each student's responsibility to understand and adhere to the SOPPS Code of Professional Conduct (<https://catalog.northeastern.edu/graduate/health-sciences/academic-policies-procedures/code-conduct-sopps/>) and to Northeastern University's Academic Integrity Policy (p. 88). Definitions of plagiarism, cheating, fabrication, falsification, unauthorized collaboration, and actions that facilitate academic or research dishonesty can be found on the Office of Student Conduct and Conflict Resolution website (<https://osccr.sites.northeastern.edu/>). The lack of knowledge of these definitions does not excuse the student's responsibility for upholding them. Offenses of academic honesty and research integrity are egregious violations of ethical standards and may result in disciplinary actions, including the student's immediate dismissal from the graduate program.

SCHOOL OF PHARMACY AND PHARMACEUTICAL SCIENCES CODE OF PROFESSIONAL CONDUCT

All SOPPS students (BS Pharmaceutical Sciences, Preprofessional, MS, and PhD) are expected to adhere to the SOPPS Code of Professional Conduct.

MASTER OF SCIENCE THESIS OPTION

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the student's abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS student research positions and the specific research focus.

Thesis Registration

Students may receive a maximum of 4 semester hours of credit for MS thesis research. Students should register for Thesis (PHSC 6990), twice for 2 semester hours each during the fall and spring semesters of their second full year of study, or after completing 15 credits of study. If completion of the thesis requires additional time, students should register for Thesis Continuation (PHSC 6996)(0 SH).

Thesis Committee

Each student's thesis committee should be composed of at least three members: two from the sponsoring program and one from outside the student's program. The outside member may be a Northeastern faculty member. The director of graduate studies for the pharmaceutical sciences department may appoint additional members, as considered necessary for student development. The student's major advisor, in whose laboratory the research is being conducted, will serve as committee chair. The student, after consulting with the committee chair, is responsible for calling all thesis committee meetings.

Thesis Proposal

The thesis proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should conform to the format and structure of an NIH grant proposal with four sections: specific aims, background and significance, preliminary studies, and experimental design and methods. See the Department of Pharmaceutical Sciences "Thesis Proposal" document for detailed instructions on the preparation of a thesis proposal and the required forms located in the SOPPS Student Portal on Canvas in the module section.

The thesis proposal must be defended orally before the thesis committee and verbally agreed on by all thesis committee members before the student undertakes the planned research. Once approved by the committee, the student should inform the director of graduate studies.

Thesis Final Defense

The final defense is taken after the student completes the thesis research and all other requirements for the MS degree. The defense deals with the subject matter of the thesis, significant developments in the field, and the student's background knowledge in their field of specialization. The thesis committee conducts the final defense.

At least two weeks prior to the expected date of the oral defense, the written thesis must be circulated to the student's thesis committee. After initial committee evaluation, recommendation may be made that the student clarify or rewrite portions of the thesis before scheduling the final defense. After the thesis committee concurs that the thesis is acceptable, a date is chosen for the final oral examination. At least two weeks prior to the defense, the student should inform the director of graduate studies in the pharmaceutical sciences department so that an announcement can be distributed to faculty and students. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student, and responses to audience and committee questions, the student's committee meets in executive session to decide whether the student has successfully defended the thesis. The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and the thesis is signed off and passed on to the director of graduate studies in the department. Requests for a second defense are unusual but may be permitted if the original oral defense was judged significantly inadequate.

Thesis Deadline

The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Required Core		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
or PHSC 6213	Ethical Problems in Health Sciences Research	
Medicinal Chemistry & Drug Discovery		
CHEM 5626	Organic Synthesis 1	3
CHEM 5628	Principles of Spectroscopy of Organic Compounds	3
CHEM 5672	Organic Synthesis 2	3
CHEM 5676	Bioorganic Chemistry	3
PHSC 5400	Principles of Drug Design	3
PHSC 6222	The Chemistry and Biology of Drugs of Abuse	2
PHSC 6224	Behavioral Pharmacology and Drug Discovery	2
PHSC 6290	Biophysical Methods in Drug Discovery	2

Electives

Code	Title	Hours
Complete 6 semester hours in the following subject areas:		6
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Thesis research should be taken twice.		4
PHSC 6990	Thesis	2
Thesis continuation may be taken if additional time is needed to complete the thesis.		
PHSC 6996	Thesis Continuation	

Program Credit/GPA Requirements

33 total semester hours required

Minimum 3.000 GPA required

Pharmaceutical Engineering, MS (Boston)

The Master of Science in Pharmaceutical Engineering is offered jointly by Northeastern University's College of Engineering and Bouvé College of Health Sciences. The program prepares students with a fundamental understanding of pharmaceutical sciences and principles of engineering to develop the depth needed for advanced study of pharmaceutical engineering.

This program is generally pursued by students with a Bachelor of Science in Chemical Engineering or closely allied fields in engineering, sciences, or mathematics. The program was designed in collaboration with the Department of Pharmaceutical Sciences to develop the depth needed for advanced study of pharmaceutical engineering. Students wishing to pursue the master's degree with undergraduate educational backgrounds other than engineering are required to demonstrate completion of mathematics coursework through differential equations or the equivalent to be admitted. Prior completion of at least one semester of organic chemistry or the equivalent is also required, and some prior exposure to concepts in biochemistry and molecular biology is helpful. Students are advised to work closely with their advisors and instructors to determine the electives that would meet their career goals.

Part-Time Students

Part-time students may progress according to their plans and time constraints but within the seven-year time limit.

Master of Science students wishing to change their status from part time to full time must notify the chemical engineering department and make a formal petition to the Graduate School of Engineering. Refer to the regulations of the Graduate School of Engineering for further information on academic administrative policies.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
CHME 6390	Professional Development and Communication Essentials (Complete this course twice.) ¹	0
CHME 7600	Pharmaceutical Engineering I	4
CHME 7601	Pharmaceutical Engineering II	4
CHME 7602	Pharmaceutical Engineering Laboratory	2
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 7010	Pharmaceutical Sciences Laboratory	4

¹ To be completed each of the first two semesters in the program.

Restricted Elective Courses

Code	Title	Hours
At least 4 semester hours of elective coursework is required from CHME, and at least 2 semester hours of elective coursework is required from PHSC and PMST. These semester hours could come from any elective group, as appropriate.		

Regulatory

Complete 3–4 semester hours from the following: 3-4

BIOE 5250	Regulatory and Quality Aspects of Medical Device Design
BIOT 5340	Introduction to Biotherapeutic Approvals
BIOT 5500	Concepts in Regulatory Science
BIOT 6320	Design and Development of Biopharmaceuticals
RGA 6002	Introduction to Regulatory Compliance and Practice

Quality/Statistics

Complete 4 semester hours from the following: 4

CHME 5185	Design of Experiments and Ethical Research (DOEER)
CHME 6320	Numerical and Statistical Methods for Chemical Engineering
CHME 6410	Chemical Engineering Research Methods
IE 6200	Engineering Probability and Statistics
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
PHSC 6214	Experimental Design and Biostatistics

Depth Electives

Complete 6–7 semester hours from the following: 6-7

BIOE 5115	Dynamical Systems in Biological Engineering
BIOE 5411	Applied Molecular Bioengineering
BIOE 5510	Bioengineering Products/Technology Commercialization
BIOE 5860	Engineering Approaches to Precision Medicine I
BIOT 5330	Drug Safety and Immunogenicity
BIOT 6300	Pharmaceutical Microbiology
BIOT 6340	Sterile Manufacturing Operations
CHME 5160	Drug Delivery: Engineering Analysis
CHME 5179	Complex Fluids and Everyday Materials
CHME 5185	Design of Experiments and Ethical Research (DOEER)
CHME 5510	Fundamentals in Process Safety Engineering
CHME 5515	Process Safety Engineering for Biotechnology and Pharmaceutical Industries
CHME 5631	Biomaterials Principles and Applications

or BIOE 5820	Biomaterials
CHME 5632	Advanced Topics in Biomaterials
CHME 5683	Introduction to Polymer Science
CHME 7330	Chemical Engineering Thermodynamics
CHME 7350	Transport Phenomena
PHSC 5300	Pharmaceutical Biochemistry
PHSC 5310	Cellular Physiology
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies
PHSC 5555	Pharmaceutical Toxicology
PHSC 5560	Nanotoxicity
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Pharmaceuticals and Drug Delivery, MS (Boston)

Just as cars are useless without roads, drugs are useless without effective delivery systems. This is especially important in contemporary pharmaceutical research, as new chemical entities may be either too hydrophobic (e.g., many anticancer drugs) or hydrophilic and highly labile (e.g., nucleic acids). The Bouvé College of Health Sciences School of Pharmacy Pharmaceuticals and Drug Delivery students and faculty are developing the routes for bringing small-molecule drugs and biological therapies directly to target cells responsible for major diseases.

Our comprehensive Pharmaceuticals and Drug Delivery MS program includes faculty members in pharmaceuticals and drug development specializing in the use and delivery of therapeutics. The program faculty seeks to improve the understanding and description of how chemical and physical properties of drugs and dosage forms affect drug performance in healthy and diseased systems. Graduate students may choose from programs concentrating in:

- Novel drug delivery systems
- Biopharmaceutics and pharmacokinetics
- Physical pharmacy and polymeric dosage form development
- Drug metabolism

With a strong focus on nanotechnology-based advanced delivery systems that address contemporary therapeutic needs, the pharmaceutical sciences program also gives students opportunities to study with some of the world's top pharmaceuticals researchers. Students in the Pharmaceuticals and Drug Delivery MS program have the option of performing industrial internships (typically during the summer) in some of the most prestigious pharmaceutical and biotechnology companies in the Boston area.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Curriculum Requirements

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis and may include an optional research thesis. International students are required to attend the program on a full-time basis.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average of 3.200 or better; be in good academic and professional standing (i.e., have no Professionalism Concern forms filed); and have no instances of academic dishonesty or blocks on enrollment.
2. In order to be eligible for internship, students must take the Professional Development for Pharmaceutical Sciences (PHSC 5305) course in either the fall or spring semester of their first year.
3. Students are in school full-time in addition to working on their internships.
4. There are no vacations on internships. Companies' sick time policies may vary. Students should check with their employers.
5. Students are responsible for finding their own internship and must be honest and accurate in representing their experiences on their resumés. Prior to looking for an internship, students must have their faculty advisor approve their resumé and ascertain to the best of their ability that the skills and training of students are as presented.
6. Students must not accept more than one position. They must honor the first offer accepted.
7. In order to receive a grade for the course, students must write at least two learning goals and a paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
8. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training authorization from the Office of Global Services every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the postgraduation benefit of Post-Completion Optional Practical Training.
9. Students receive 1 academic credit per semester for Pharmaceutical Science Internship (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for Pharmaceutical Science Internship (PHSC 6401). The 4th credit for Pharmaceutical Science Internship (PHSC 6401) will not be added to the student's degree.
10. Taking internship must not extend international students' visas.

General Policies Common to All MS Programs in the Department of Pharmaceutical Sciences

GRADING POLICY

Students are expected to maintain a GPA of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p.) and Academic Probation Policy (p.) for full details.

PROGRESSION REQUIREMENT

Bouvé College of Health Sciences policy specifies that students register for coursework or continuation credit each semester of the academic year (fall and spring semesters) after they are matriculated as full- or part-time students. Moreover, international students are required to maintain full-time student status during each academic term; consult the Office of Global Services (<https://international.northeastern.edu/ogs/>) for specific requirements. Domestic students who are not able to register for courses during a particular semester must petition the director of graduate studies in the department for exemption in writing and state the reasons for the exemption and their plan for resuming their studies. Approval of the petition will preserve student status in the MS program.

All MS students are expected to complete the degree requirements within two years if enrolled on a full-time basis, or within three to five years if enrolled on a part-time basis. If progress toward the degree is slowed or interrupted for personal reasons, the student so affected must petition the School of Pharmacy and Pharmaceutical Sciences Academic Standing Committee for an extension, detailing the anticipated time to completion. If an extension is approved, the student will be directed to meet with the graduate program director to devise a formal plan to achieve completion of the degree.

Course credits earned in the Bouvé College of Health Sciences Graduate School or accepted for transfer from another institution and not applied to obtain a previous degree are valid for a maximum of seven years. Refer to the Bouvé College of Health Sciences Academic Progression policies and procedures (p.) for details.

ACADEMIC HONESTY AND RESEARCH INTEGRITY

The Department of Pharmaceutical Sciences has a zero-tolerance policy regarding academic dishonesty and violations of research integrity. It is each student's responsibility to understand and adhere to the SOPPS Code of Professional Conduct (<https://catalog.northeastern.edu/graduate/health-sciences/academic-policies-procedures/code-conduct-sopps/>) and to Northeastern University's Academic Integrity Policy (p. 88). Definitions of plagiarism, cheating, fabrication, falsification, unauthorized collaboration, and actions that facilitate academic or research dishonesty can be found on the Office of Student Conduct and Conflict Resolution website (<https://osccr.sites.northeastern.edu/>). The lack of knowledge of these definitions does not excuse the student's responsibility for upholding them. Offenses of academic honesty and research integrity are egregious violations of ethical standards and may result in disciplinary actions, including the student's immediate dismissal from the graduate program.

SCHOOL OF PHARMACY AND PHARMACEUTICAL SCIENCES CODE OF PROFESSIONAL CONDUCT

All SOPPS students (BS Pharmaceutical Sciences, Preprofessional, MS, and PhD) are expected to adhere to the SOPPS Code of Professional Conduct.

MASTER OF SCIENCE THESIS OPTION

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the student's abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS student research positions and the specific research focus.

Thesis Registration

Students may receive a maximum of 4 semester hours of credit for MS thesis research. Students should register for Thesis (PHSC 6990), twice for 2 semester hours each during the fall and spring semesters of their second full year of study, or after completing 15 credits of study. If completion of the thesis requires additional time, students should register for Thesis Continuation (PHSC 6996)(0 SH).

Thesis Committee

Each student's thesis committee should be composed of at least three members: two from the sponsoring program and one from outside the student's program. The outside member may be a Northeastern faculty member. The director of graduate studies for the pharmaceutical sciences department may appoint additional members, as considered necessary for student development. The student's major advisor, in whose laboratory the research is being conducted, will serve as committee chair. The student, after consulting with the committee chair, is responsible for calling all thesis committee meetings.

Thesis Proposal

The thesis proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should conform to the format and structure of an NIH grant proposal with four sections: specific aims, background and significance, preliminary studies, and experimental design and methods. See the Department of Pharmaceutical Sciences "Thesis Proposal" document for detailed instructions on the preparation of a thesis proposal and the required forms located in the SOPPS Student Portal on Canvas in the module section.

The thesis proposal must be defended orally before the thesis committee and verbally agreed on by all thesis committee members before the student undertakes the planned research. Once approved by the committee, the student should inform the director of graduate studies.

Thesis Final Defense

The final defense is taken after the student completes the thesis research and all other requirements for the MS degree. The defense deals with the subject matter of the thesis, significant developments in the field, and the student's background knowledge in their field of specialization. The thesis committee conducts the final defense.

At least two weeks prior to the expected date of the oral defense, the written thesis must be circulated to the student's thesis committee. After initial committee evaluation, recommendation may be made that the student clarify or rewrite portions of the thesis before scheduling the final defense. After the thesis committee concurs that the thesis is acceptable, a date is chosen for the final oral examination. At least two weeks prior to the defense, the student should inform the director of graduate studies in the pharmaceutical sciences department so that an announcement can be distributed to faculty and students. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student, and responses to audience and committee questions, the student's committee meets in executive session to decide whether the student has successfully defended the thesis. The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and the thesis is signed off and passed on to the director of graduate studies in the department. Requests for a second defense are unusual but may be permitted if the original oral defense was judged significantly inadequate.

Thesis Deadline

The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Required Core		
Complete the following courses:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2

or PHSC 6213	Ethical Problems in Health Sciences Research	
PHSC 5300	Pharmaceutical Biochemistry ¹	2 or 4
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology ¹	2 or 4
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 6214	Experimental Design and Biostatistics	2
PHSC 6216	Human Physiology and Pathophysiology	2
Pharmaceutics and Drug Delivery		
PMST 6250	Advanced Physical Pharmacy	2
PMST 6252	Pharmacokinetics and Drug Metabolism	3
PMST 6254	Advanced Drug Delivery Systems	3

Electives

Code	Title	Hours
Complete 9–11 semester hours from the following subject areas: ¹		9-11
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Thesis research should be taken twice.		4
PHSC 6990	Thesis	2
Thesis continuation may be taken if additional time is needed to complete the thesis.		
PHSC 6996	Thesis Continuation	

¹ Students who opt to complete 4-credit Pharmaceutical Sciences Laboratory (PHSC 7010) in the core requirements may complete the degree with 9 elective credits; all other students must complete 11 elective credits.

Program Credit/GPA Requirements

33 total semester hours required

Minimum 3.000 GPA required

Pharmacology, MS (Boston)

Graduate education in pharmacology embodies the principles and mechanisms of drug action in biological systems. Through coursework, seminars, and conferences, students in the pharmacology MS program gain exposure to both classical and recent approaches that have led to the development of current theories of drug action and therapeutic application. Pharmacology should not be confused with pharmacy programs or training, which lead to professional licensure as a pharmacist and involve medication management.

Curriculum Requirements

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis and may include an optional research thesis. International students are required to attend the program on a full-time basis.

Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average of 3.200 or better; be in good academic and professional standing (i.e., have no Professionalism Concern forms filed); and have no instances of academic dishonesty or blocks on enrollment.
2. In order to be eligible for internship, students must take the Professional Development for Pharmaceutical Sciences (PHSC 5305) course in either the fall or spring semester of their first year.

3. Students are in school full-time in addition to working on their internships.
4. There are no vacations on internships. Companies' sick time policies may vary. Students should check with their employers.
5. Students are responsible for finding their own internship and must be honest and accurate in representing their experiences on their resumés. Prior to looking for an internship, students must have their faculty advisor approve their resumé and ascertain to the best of their ability that the skills and training of students are as presented.
6. Students must not accept more than one position. They must honor the first offer accepted.
7. In order to receive a grade for the course, students must write at least two learning goals and a paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
8. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training authorization from the Office of Global Services every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the postgraduation benefit of Post-Completion Optional Practical Training.
9. Students receive 1 academic credit per semester for Pharmaceutical Science Internship (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for Pharmaceutical Science Internship (PHSC 6401). The 4th credit for Pharmaceutical Science Internship (PHSC 6401) will not be added to the student's degree.
10. Taking internship must not extend international students' visas.

General Policies Common to All MS Programs in the Department of Pharmaceutical Sciences

GRADING POLICY

Students are expected to maintain a GPA of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p.) and Academic Probation Policy (p.) for full details.

PROGRESSION REQUIREMENT

Bouvé College of Health Sciences policy specifies that students register for coursework or continuation credit each semester of the academic year (fall and spring semesters) after they are matriculated as full- or part-time students. Moreover, international students are required to maintain full-time student status during each academic term; consult the Office of Global Services (<https://international.northeastern.edu/ogs/>) for specific requirements. Domestic students who are not able to register for courses during a particular semester must petition the director of graduate studies in the department for exemption in writing and state the reasons for the exemption and their plan for resuming their studies. Approval of the petition will preserve student status in the MS program.

All MS students are expected to complete the degree requirements within two years if enrolled on a full-time basis, or within three to five years if enrolled on a part-time basis. If progress toward the degree is slowed or interrupted for personal reasons, the student so affected must petition the School of Pharmacy and Pharmaceutical Sciences Academic Standing Committee for an extension, detailing the anticipated time to completion. If an extension is approved, the student will be directed to meet with the graduate program director to devise a formal plan to achieve completion of the degree.

Course credits earned in the Bouvé College of Health Sciences Graduate School or accepted for transfer from another institution and not applied to obtain a previous degree are valid for a maximum of seven years. Refer to the Bouvé College of Health Sciences Academic Progression policies and procedures (p.) for details.

ACADEMIC HONESTY AND RESEARCH INTEGRITY

The Department of Pharmaceutical Sciences has a zero-tolerance policy regarding academic dishonesty and violations of research integrity. It is each student's responsibility to understand and adhere to the SOPPS Code of Professional Conduct (<https://catalog.northeastern.edu/graduate/health-sciences/academic-policies-procedures/code-conduct-sopps/>) and to Northeastern University's Academic Integrity Policy (p. 88). Definitions of plagiarism, cheating, fabrication, falsification, unauthorized collaboration, and actions that facilitate academic or research dishonesty can be found on the Office of Student Conduct and Conflict Resolution website (<https://osccr.sites.northeastern.edu/>). The lack of knowledge of these definitions does not excuse the student's responsibility for upholding them. Offenses of academic honesty and research integrity are egregious violations of ethical standards and may result in disciplinary actions, including the student's immediate dismissal from the graduate program.

SCHOOL OF PHARMACY AND PHARMACEUTICAL SCIENCES CODE OF PROFESSIONAL CONDUCT

All SOPPS students (BS Pharmaceutical Sciences, Preprofessional, MS, and PhD) are expected to adhere to the SOPPS Code of Professional Conduct.

MASTER OF SCIENCE THESIS OPTION

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the student's abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS student research positions and the specific research focus.

Thesis Registration

Students may receive a maximum of 4 semester hours of credit for MS thesis research. Students should register for Thesis (PHSC 6990), twice for 2 semester hours each during the fall and spring semesters of their second full year of study, or after completing 15 credits of study. If completion of the thesis requires additional time, students should register for Thesis Continuation (PHSC 6996)(0 SH).

Thesis Committee

Each student's thesis committee should be composed of at least three members: two from the sponsoring program and one from outside the student's program. The outside member may be a Northeastern faculty member. The director of graduate studies for the pharmaceutical sciences department may appoint additional members, as considered necessary for student development. The student's major advisor, in whose laboratory the research is being conducted, will serve as committee chair. The student, after consulting with the committee chair, is responsible for calling all thesis committee meetings.

Thesis Proposal

The thesis proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should conform to the format and structure of an NIH grant proposal with four sections: specific aims, background and significance, preliminary studies, and experimental design and methods. See the Department of Pharmaceutical Sciences "Thesis Proposal" document for detailed instructions on the preparation of a thesis proposal and the required forms located in the SOPPS Student Portal on Canvas in the module section.

The thesis proposal must be defended orally before the thesis committee and verbally agreed on by all thesis committee members before the student undertakes the planned research. Once approved by the committee, the student should inform the director of graduate studies.

Thesis Final Defense

The final defense is taken after the student completes the thesis research and all other requirements for the MS degree. The defense deals with the subject matter of the thesis, significant developments in the field, and the student's background knowledge in their field of specialization. The thesis committee conducts the final defense.

At least two weeks prior to the expected date of the oral defense, the written thesis must be circulated to the student's thesis committee. After initial committee evaluation, recommendation may be made that the student clarify or rewrite portions of the thesis before scheduling the final defense. After the thesis committee concurs that the thesis is acceptable, a date is chosen for the final oral examination. At least two weeks prior to the defense, the student should inform the director of graduate studies in the pharmaceutical sciences department so that an announcement can be distributed to faculty and students. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student, and responses to audience and committee questions, the student's committee meets in executive session to decide whether the student has successfully defended the thesis. The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and the thesis is signed off and passed on to the director of graduate studies in the department. Requests for a second defense are unusual but may be permitted if the original oral defense was judged significantly inadequate.

Thesis Deadline

The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
Required Core		
Complete the following courses:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
or PHSC 6213	Ethical Problems in Health Sciences Research	
PHSC 5300	Pharmaceutical Biochemistry ¹	2-4
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 5310	Cellular Physiology ¹	2-4
or PHSC 7010	Pharmaceutical Sciences Laboratory	
PHSC 6214	Experimental Design and Biostatistics	2
PHSC 6216	Human Physiology and Pathophysiology	2

Pharmacology

PMCL 6250	Ion Channel Physiology and Pharmacology	3
PMCL 6252	Small-Molecule Target and Ligand Pharmacology	4

Electives

Code	Title	Hours
Complete 10–12 semester hours from the following subject areas: ¹		10-12
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		

Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Thesis research should be taken twice.		4
PHSC 6990	Thesis	
Thesis continuation may be taken if additional time is needed to complete the thesis.		
PHSC 6996	Thesis Continuation	

¹ Students who opt to complete 4-semester hours Pharmaceutical Sciences Laboratory (PHSC 7010) in the core requirements may complete the degree with 10 elective semester hours; all other students must complete 12 elective semester hours.

Program Credit/GPA Requirements

33 total semester hours required

Minimum 3.000 GPA required

Pharmacy, PharmD—Direct Entry / Public Health, MPH (Boston)

The School of Pharmacy and Pharmaceutical Sciences and the Department of Health Sciences offer a combined Doctor of Pharmacy (PharmD) and Master of Public Health (MPH) program.

The combined PharmD/MPH program recognizes and reinforces the importance of public health in pharmacy practice. Central to addressing public health concerns, and in particular those associated with racial and ethnic health disparities, the program is committed to building a strong, diverse, and activist public health workforce. The goal of the program is to graduate professionals who are well educated in the complex issues associated with disparate health status and healthcare access. The combined PharmD/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust understanding of public health through an MPH degree while also completing their PharmD.

Refer to the School of Pharmacy and Pharmaceutical Sciences PharmD—Direct Entry (p. 939) and Department of Health Sciences Master of Public Health (p. 869) pages of this catalog for program requirements and technical standards. Students must adhere to all PharmD and MPH program standards, policies, and requirements as listed in the catalog, unless otherwise specified.

The Northeastern University Master of Public Health Program is accredited by the Council of Education for Public Health (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

Cannabis Science, Graduate Certificate (Boston)

The Graduate Certificate in Cannabis Science offers coursework in cannabis history, business, and law/policy with a primary focus on the chemical/biochemical, pharmacological, scientific, and health/therapeutic aspects of cannabis. This program is designed for students with a strong science background who want to explore the cannabis industry. It provides the knowledge needed to advance careers in healthcare, public policy, or health law, while supporting policy development and public health initiatives. Students have an opportunity to gain a comprehensive understanding of cannabis analysis and applications, the human endocannabinoid system, and the medicinal and clinical implications of cannabis.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Requirements

Code	Title	Hours
Complete three of the following:		12
PHSC 5910	Applied Sciences for the Cannabis Industry	
PHSC 5920	Clinical Application of Cannabis and Cannabinoids	

PHSC 5930	Advanced Translational Research on Medical Cannabis and Cannabinoids
PHSC 5940	Cannabis Laws, Standards, and Politics

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

School of Law

James R. Hackney, JD, Dean

Hemanth C. Gundavaram, JD, Associate Dean for Academic and Faculty Affairs

Kristin Madison, JD, PhD, Associate Dean for Academic Programs

Greg Houghton, MBA, MSF, Associate Dean for Administration and Finance

Julian M. Fray, JD, LLM, Associate Dean for Digital Strategy

Kiana Pierre-Louis, JD, Associate Dean for Belonging and Student Affairs

Lua Yuille, JD, Associate Dean for Research and Interdisciplinary Education

Northeastern University School of Law (<https://law.northeastern.edu/>)
416 Huntington Avenue
Boston, MA 02115
617.373.5149

Today's legal environment demands that attorneys be nimble, entrepreneurial, and savvy; in all of these regards, graduates of the Northeastern University School of Law excel. Our curriculum, taught by nationally recognized faculty, provides students with a superior understanding of how the law applies in real settings, a strong ethical framework, and the experience to strategically pursue their professional objectives. Our co-op program sets us apart from all other law schools—our JD students complete many hours of work in law offices, judges' chambers, corporations, nonprofit organizations, and government. As a result of their co-op experiences, Northeastern JD students are not just sitting in classes hearing about the rapid changes in the legal world—they live them.

Our community also provides a refreshing refutation of the law school stereotype as a place of ruthless competition and blind ambition. Instead, we cultivate an atmosphere that is collaborative, collegial, and supportive. Our students' eagerness to work in teams, help one another, and share their experiences reflects that ethos. Our faculty and staff are exceptionally supportive of students—not only because our small community encourages extensive student-faculty interaction but also because they share their students' passion for justice.

In addition to offering both full-time and part-time JD programs, the School of Law offers on-campus and online LLM programs for lawyers, a Master of Legal Studies program for nonlawyers, and a number of other programs. Our suite of LLM opportunities is offered for both those who hold a U.S. law degree and those who hold a first professional law degree from a law school outside of the United States.

Programs

Juris Doctor (JD)

- Law (Boston) (p. 962)

Master of Laws (LLM)

- Law (Boston) (p. 964)
- Law (p. 967)—Experiential (Boston)
- Law—Online

Master of Legal Studies (MLS)

- Legal Studies—Online (p. 970)

Master of Science (MS)

- Media Advocacy (Boston) (p. 232)

Graduate Certificates

- Business Law (Boston) (p. 973)
- Healthcare Compliance (Boston) (p. 973)
- Health Law (Boston) (p. 974)
- Human Resources Law (Boston) (p. 976)
- Intellectual Property Law (Boston) (p. 977)
- United States Law (Boston) (p. 981)

FOR JD STUDENTS ONLY:

- Health Law and Policy (Boston) (p. 975)
- Human Rights Law (Boston) (p. 976)

- Legal Design (Boston) (p. 978)
- Poverty Law and Economic Justice (Boston) (p. 979)
- Privacy Law (Boston) (p. 981)
- Women, Gender, Sexuality, and the Law (Boston) (p. 982)

Dual Degrees

- Law, JD / Accounting and Business Administration, MSAMBA (Boston) (p. 305)
- Law, JD / Business Administration, MBA—Full-Time (Boston) (p. 305)
- Law, JD / Criminology and Justice Policy, PhD (Boston) (p. 984)
- Law, JD / Criminology and Criminal Justice, MS (Boston) (p. 984)
- Law, JD / Public Health, MPH (Boston) (p. 810)
- Law, JD / Public Policy, MPP (Boston) (p. 984)
- Law, LLM / Business Administration, MBA—Full-Time (Boston) (p. 305)

Academic Policies and Procedures

Below, you will find select policies pertaining to the Juris Doctor program. For a comprehensive document with all policies and procedures, see the JD Student Handbook (<https://asa.law.northeastern.edu/>).

- Grades (p. 962)

Grades

Grades

Students will receive credit for courses in which they receive a grade of “High Honors,” “Honors,” “Pass,” or “Marginal Pass” but not for courses in which they receive a grade of “Fail.” If any class is designated as offered on a credit/fail basis, students will not receive credit for the class if they receive a grade of “Fail.”

Incomplete Grades

The School of Law follows university policy on incomplete grades (p. 123).

Law, JD (Boston)

Overview

Students at Northeastern University School of Law gain unparalleled networking opportunities from the moment they walk in the door. While many law schools talk about offering work experience, Northeastern Law has been the nation’s leader in experiential legal education for five decades. Northeastern launched its Cooperative Legal Education Program in 1968 and today offers the largest and most extensive hands-on professional program in the country. Students devote several of their upper-level terms to working full-time as legal professionals. Through the co-op program, students have the opportunity to experience various fields of law in multiple practice settings.

Northeastern Law students gain real work experience and networking opportunities that far exceed the offerings of other law schools. With more than 1,500 employers in more than 40 states and a number of countries around the world, Northeastern students create professional networks in legal offices ranging from large firms in Boston to government agencies in Washington, D.C., to human rights organizations in Geneva. Through these connections and with access to the more than 8,000 alumni, Northeastern Law students graduate with not only a resumé packed full of experience but also a network that is unrivaled.

The School of Law offers a curriculum that provides students the tools they will need to pursue a successful legal career. In their first year, JD students complete required coursework. In their second and third years, they explore areas of interest by completing multiple full-time co-ops and taking courses that provide insight into many areas of the law.

Interdisciplinary Graduate Certificates

The School of Law offers JD students the option to pursue one of the following interdisciplinary graduate certificates:

- Health Law and Policy (p. 975)
- Human Rights Law (p. 976)
- Legal Design (p. 978)
- Poverty Law and Economic Justice (p. 979)
- Privacy Law (p. 981)
- Women, Gender, Sexuality, and the Law (p. 982)

Dual Degrees

The School of Law offers multiple dual degrees (p. 983).

For a more comprehensive description of policies, procedures, and requirements pertaining to the JD program, please refer to the School of Law’s website (<https://www.northeastern.edu/lawstudentaffairs/>).

Full-Time Option

Complete all courses and requirements described below.

Milestones

Code	Title	Hours
Public Interest Requirement ¹		
Upper-Level Rigorous Writing Requirement ²		
Experiential Education Requirement ²		

Co-op Requirement: Co-ops corresponding to three terms³

Note: All courses used to satisfy JD requirements must be completed with a passing grade. Students must satisfactorily complete all JD requirements, including the public interest requirement, the upper-level rigorous writing requirement, the experiential education requirement, and the co-op requirement.

First-Year Course Requirements

Code	Title	Hours
Fall Term		
LAW 6100	Civil Procedure	5
LAW 6105	Property	4
LAW 6106	Torts	4
LAW 6160	Legal Skills in Social Context: Foundations of Social Justice Project	2
LAW 6165	Legal Skills in Social Context: Foundations of Legal Research and Writing	2
Spring Term		
LAW 6101	Constitutional Law	4
LAW 6102	Contracts	5
LAW 6103	Criminal Justice	4
LAW 6161	Legal Skills in Social Context: Social Justice Project	2
LAW 6166	Legal Skills in Social Context: Legal Research and Writing	2

Upper-Level Course Requirements

Code	Title	Hours
Professional Responsibility		
LAW 7443	Professional Responsibility	3
Electives		
Complete 46 credits of elective coursework.		46

Rules and policies applicable to elective coursework are described in the School of Law Student Information Handbook.

Program Credit Requirement

83 total credits required.

¹ Information about the public interest requirement is provided in the Student Information Handbook.

² The same course cannot be used to satisfy both the rigorous writing and experiential education requirements.

³ Transfer students should consult the Student Information Handbook for applicable requirements. All students with questions about satisfying co-op requirements should consult the Center for Co-op and Career Development.

Part-Time Option

Complete all courses and requirements described below.

Milestones

Code	Title	Hours
Public Interest Requirement¹		
Upper-Level Rigorous Writing Requirement²		
Experiential Education Requirement²		

Two practical experiences during separate terms when the student is not registered for coursework other than the practical experience(s), including at least one co-op in the form of a field placement with a related seminar; and 1,000 hours of relevant work experience.³

Note: All courses used to satisfy JD requirements must be completed with a passing grade. Students must satisfactorily complete all JD requirements, including the public interest requirement, the upper-level rigorous writing requirement, the experiential education requirement, and the co-op, field placement, practical experience, and relevant work experience requirement.

First-Year Course Requirements

Code	Title	Hours
Students will take the following courses during their first four semesters:		
LAW 6100	Civil Procedure	5
LAW 6101	Constitutional Law	4

LAW 6102	Contracts	5
LAW 6103	Criminal Justice	4
LAW 6105	Property	4
LAW 6106	Torts	4
LAW 6160	Legal Skills in Social Context: Foundations of Social Justice Project	2
LAW 6165	Legal Skills in Social Context: Foundations of Legal Research and Writing	2
LAW 6161	Legal Skills in Social Context: Social Justice Project	2
LAW 6166	Legal Skills in Social Context: Legal Research and Writing	2

Upper-Level Course Requirements

Code	Title	Hours
Field Placement		
Complete one course from each of the following two pairs of courses:		8
LAW 7940	Reflections on Lawyering	
or LAW 7945	Field Placement Seminar	
LAW 7941	Public Interest / Public Service Field Placement	
or LAW 7946	Field Placement	
Professional Responsibility		
LAW 7443	Professional Responsibility	3
Electives		
Complete 38 credits of LAW courses not already taken to fulfill another requirement.		38

Rules and policies applicable to upper-level courses are described in the School of Law Student Information Handbook.

Program Credit Requirement

83 total credit hours required.

- ¹ Information about the public interest requirement is provided in the Student Information Handbook.
- ² The same course cannot be used to satisfy both the rigorous writing and experiential education requirements.
- ³ Transfer students should consult the Student Information Handbook for applicable requirements. All students with questions about the nature of these requirements should consult the Student Information Handbook and the Center for Co-op and Career Development.

Law, LLM (Boston)

LLM Program Requirements

The LLM program offers a rigorous curriculum that provides a comprehensive foundation in legal theory and practice as well as the freedom to explore and refine students' career interests. LLM students may choose the general program, which offers maximum flexibility to choose the courses the student wants and needs—to academically prepare for a U.S. bar exam or to do whatever the student chooses as a lawyer who wants to make a difference—or one of the program's concentrations, which provides a competitive advantage in specific fields of interest.

Complete all courses and requirements listed below unless otherwise indicated.

Foundational Courses

These foundational courses are required for any student who obtained their first law degree outside the United States:

Code	Title	Hours
LAW 6301	Introduction to American Law and Legal Institutions	2
LAW 6302	Introduction to Legal Research and Writing for LLM Students	2

Electives

Code	Title	Hours
Students must take at least 20 credits of LAW electives if they took the foundational courses; they must take at least 24 credits of LAW electives if not required to take foundational courses. Courses taken to fulfill concentration requirements count toward the elective requirement.		20 or 24

Concentration Options

Students may choose to pursue a concentration by completing the listed requirements. Courses taken to fulfill concentration requirements count toward the elective requirement for the LLM degree.

- Business and Commercial Law (p. 965)
- Health Policy and Law (p. 965)
- Human Rights and Economic Development (p. 966)
- Intellectual Property and Innovation (p. 966)

Program Credit Requirement

24 total hours required

For additional information regarding the LLM program and its requirements, please see the LLM student information handbook.

Business and Commercial Law Concentration

Code	Title	Hours
Core Course		
Complete one of the following:		3–4
LAW 6313	Introduction to the Law of Contracts	
LAW 7323	Corporations	
LAW 7324	Securities Regulation	
LAW 7556	Corporate Finance	
LAW 7559	International Trade	
LAW 7603	International Business Transactions	
Relevant Elective Courses		
Complete at least two of the following:		5–8
LAW 6313	Introduction to the Law of Contracts	
LAW 7015	Law, Technology, and Economic Development	
LAW 7303	Antitrust	
LAW 7313	Secured Transactions	
LAW 7323	Corporations	
LAW 7324	Securities Regulation	
LAW 7336	Immigration Law	
LAW 7338	International Law	
LAW 7369	Intellectual Property	
LAW 7424	Labor Law I	
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7556	Corporate Finance	
LAW 7559	International Trade	
LAW 7569	International and Foreign Legal Research	
LAW 7603	International Business Transactions	

Students must also complete a paper related to business and/or commercial law. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

Health Policy and Law Concentration

Code	Title	Hours
Core Course		
LAW 7335	Health Law	3–4
Relevant Elective Courses		
Complete at least two of the following:		6–7
LAW 7494	Bioethics and the Law	
LAW 7512	Problems in Public Health Law	
LAW 7527	Public Health Advocacy Clinic	
LAW 7588	Reproductive Rights, Justice, and Health	
LAW 7606	Drug Law and Policy	
LAW 7619	Healthcare Fraud and Abuse Law	
LAW 7695	Drug and Device Innovation: Law and Policy	

Students must also complete a paper related to health law. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

Human Rights and Economic Development Concentration

Code	Title	Hours
Core Course		
Complete one of the following:		3–4
LAW 7338	International Law	
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7651	Human Rights in the United States	
LAW 7697	Issues in Human Rights and Humanitarian Law	
Relevant Elective Courses		
Complete at least two of the following:		5–16
LAW 6314	Introduction to U.S. Constitutional Law	
LAW 7015	Law, Technology, and Economic Development	
LAW 7336	Immigration Law	
LAW 7338	International Law	
LAW 7358	Social Welfare Law	
LAW 7428	State Local Government	
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7550	Refugee and Asylum Law	
LAW 7559	International Trade	
LAW 7569	International and Foreign Legal Research	
LAW 7588	Reproductive Rights, Justice, and Health	
LAW 7597	Civil Rights and Restorative Justice Clinic	
LAW 7610	Community Business Law Clinic	
LAW 7651	Human Rights in the United States	
LAW 7657	Immigrant Justice Clinic	
LAW 7679	Race and the Law	
LAW 7697	Issues in Human Rights and Humanitarian Law	
LAW 7702	Crimmigration Law: The Intersection of Criminal Law and Immigration Law	
LAW 7705	Law and Global Technology	
LAW 7706	State Constitutions and the Protection of Individual Rights	

Students must also complete a paper related to human rights and/or economic development. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

Intellectual Property and Innovation Concentration

Code	Title	Hours
Core Course		
Complete one of the following:		3–4
LAW 7369	Intellectual Property	
LAW 7501	Patent Law	
LAW 7590	Copyright Law	
LAW 7638	Trademark Law	
Relevant Elective Courses		
Complete at least two of the following:		6–12
LAW 7015	Law, Technology, and Economic Development	
LAW 7303	Antitrust	
LAW 7323	Corporations	
LAW 7369	Intellectual Property	
LAW 7417	Entertainment Law	
LAW 7501	Patent Law	

LAW 7590	Copyright Law
LAW 7633	Intellectual Property Law Clinic
LAW 7638	Trademark Law
LAW 7640	Information Security Law
LAW 7669	Law and Technology
LAW 7672	Data Privacy Compliance in the 21st Century
LAW 7695	Drug and Device Innovation: Law and Policy
LAW 7698	AI for Lawyers: Uses, Risks, and Regulation
LAW 7700	Intellectual Property and Social Justice
LAW 7705	Law and Global Technology

Students must also complete a clinic or paper related to intellectual property and innovation. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement. A clinic that counts toward the four-course requirement may not be used to also satisfy this requirement.

LLM Experiential Program Requirements

The Experiential LLM program offers a rigorous curriculum that is designed to provide a comprehensive foundation in legal theory and practice as well as the freedom to explore and refine students' career interests. Experiential LLM students may choose the general program, which offers maximum flexibility to choose the courses the student wants and needs—to academically prepare students for a U.S. bar exam or to do whatever the student chooses as a lawyer who wants to make a difference—or one of the program's concentrations, which provide a competitive advantage in specific fields of interest. Students in the full-time Experiential LLM program deepen their knowledge and expand their expertise by taking a full-time co-op or equivalent experiential alternative during one academic term.

Complete all courses and requirements listed below unless otherwise indicated.

Foundational Courses

These foundational courses are required for any student who obtained their first law degree outside the United States:

Code	Title	Hours
LAW 6301	Introduction to American Law and Legal Institutions	2
LAW 6302	Introduction to Legal Research and Writing for LLM Students	2
LAW 6315	Legal Research and Writing for LLM Students: Preparing for Co-op	2

Electives

Code	Title	Hours
Students must take at least 18 credits of LAW electives if they took the foundational courses; they must take at least 24 credits of LAW electives if not required to take foundational courses. Courses taken to fulfill concentration requirements count toward the elective requirement.		18–24

Concentration Options

Students may choose to pursue a concentration by completing the listed requirements. Courses taken to fulfill concentration requirements count toward the elective requirement for the LLM degree.

- Business and Commercial Law (p. 965)
- Health Policy and Law (p. 968)
- Human Rights and Economic Development (p. 968)
- Intellectual Property and Innovation (p. 969)

Experiential Requirement

Students must take one full-time co-op or equivalent experiential alternative of at least 12 weeks (or, for part-time students, an equivalent period over multiple terms).

Program Credit Requirement

24 total hours required

For additional information regarding the Experiential LLM program and its requirements, please see the LLM student information handbook.

Business and Commercial Law Concentration

Code	Title	Hours
Core Course		
Complete one of the following:		3–4
LAW 6313	Introduction to the Law of Contracts	
LAW 7323	Corporations	
LAW 7324	Securities Regulation	
LAW 7556	Corporate Finance	
LAW 7559	International Trade	
LAW 7603	International Business Transactions	
Relevant Elective Courses		
Complete at least two of the following:		5–8
LAW 6313	Introduction to the Law of Contracts	
LAW 7015	Law, Technology, and Economic Development	
LAW 7303	Antitrust	
LAW 7313	Secured Transactions	
LAW 7323	Corporations	
LAW 7324	Securities Regulation	
LAW 7336	Immigration Law	
LAW 7338	International Law	
LAW 7369	Intellectual Property	
LAW 7424	Labor Law 1	
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7556	Corporate Finance	
LAW 7559	International Trade	
LAW 7569	International and Foreign Legal Research	
LAW 7603	International Business Transactions	

Students must also complete a co-op or paper related to business and/or commercial law. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

Health Policy and Law Concentration

Code	Title	Hours
Core Course		
LAW 7335	Health Law	3–4
Relevant Elective Courses		
Complete at least two of the following:		6–7
LAW 7494	Bioethics and the Law	
LAW 7512	Problems in Public Health Law	
LAW 7527	Public Health Advocacy Clinic	
LAW 7588	Reproductive Rights, Justice, and Health	
LAW 7606	Drug Law and Policy	
LAW 7619	Healthcare Fraud and Abuse Law	
LAW 7695	Drug and Device Innovation: Law and Policy	

Students must also complete a paper related to health law. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

Human Rights and Economic Development Concentration

Code	Title	Hours
Core Course		
Complete one of the following:		3
LAW 7338	International Law	
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	

LAW 7651	Human Rights in the United States
LAW 7697	Issues in Human Rights and Humanitarian Law
Relevant Elective Courses	
Complete at least two of the following:	
	5–16
LAW 6314	Introduction to U.S. Constitutional Law
LAW 7015	Law, Technology, and Economic Development
LAW 7336	Immigration Law
LAW 7338	International Law
LAW 7358	Social Welfare Law
LAW 7428	State Local Government
LAW 7491	International Human Rights and the Global Economy
LAW 7525	Law and Economic Development
LAW 7550	Refugee and Asylum Law
LAW 7559	International Trade
LAW 7569	International and Foreign Legal Research
LAW 7588	Reproductive Rights, Justice, and Health
LAW 7597	Civil Rights and Restorative Justice Clinic
LAW 7610	Community Business Law Clinic
LAW 7651	Human Rights in the United States
LAW 7657	Immigrant Justice Clinic
LAW 7679	Race and the Law
LAW 7697	Issues in Human Rights and Humanitarian Law
LAW 7702	Crimmigration Law: The Intersection of Criminal Law and Immigration Law
LAW 7705	Law and Global Technology
LAW 7706	State Constitutions and the Protection of Individual Rights

Students must also complete a co-op or paper related to human rights and/or economic development. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

Intellectual Property and Innovation Concentration

Code	Title	Hours
Core Course		
Complete one of the following:		3–4
LAW 7369	Intellectual Property	
LAW 7501	Patent Law	
LAW 7590	Copyright Law	
LAW 7638	Trademark Law	
Relevant Elective Courses		
Complete at least two of the following:		6–12
LAW 7015	Law, Technology, and Economic Development	
LAW 7303	Antitrust	
LAW 7323	Corporations	
LAW 7369	Intellectual Property	
LAW 7417	Entertainment Law	
LAW 7501	Patent Law	
LAW 7590	Copyright Law	
LAW 7633	Intellectual Property Law Clinic	
LAW 7638	Trademark Law	
LAW 7640	Information Security Law	
LAW 7669	Law and Technology	
LAW 7672	Data Privacy Compliance in the 21st Century	
LAW 7695	Drug and Device Innovation: Law and Policy	
LAW 7698	AI for Lawyers: Uses, Risks, and Regulation	
LAW 7700	Intellectual Property and Social Justice	
LAW 7705	Law and Global Technology	

Students must also complete a co-op, clinic, or paper related to intellectual property and innovation. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement. A clinic that counts toward the four-course requirement may not be used to also satisfy this requirement.

Law, LLM—Online

The online LLM program offers students an opportunity to receive specialized legal training beyond the training they have already received in a JD program or an equivalent law degree program outside the United States. The elective courses in the program will provide insight into legal issues in areas such as intellectual property, privacy, and business. Students interested in taking a bar exam will be able to strengthen their foundational knowledge of U.S. law by taking courses with content tested on bar examinations. The asynchronous online format affords flexibility with respect to the times and location at which students complete their work.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundational Course

This foundational course is required for any student who obtained their first law degree outside the United States.

Code	Title	Hours
LAW 6400	Introduction to U.S. Law and Legal System	3

Electives

Code	Title	Hours
Students must take at least 21 credits of LAW electives if they took the foundational course; they must take at least 24 credits of LAW electives if not required to take the foundational course.		21-24

Program Credit

24 total hours required

Minimum 3.000 GPA required.

Legal Studies, MLS—Online

The Master of Legal Studies program is designed for professionals who want a deeper understanding of law and legal concepts. Such professionals may be found in nonprofit organizations, foundations, financial services firms, pharmaceutical companies, insurance firms, compliance departments, or a host of other commercial and noncommercial settings. Examples of the professionals who would be interested in this degree are human resource professionals, claims representatives for insurance companies, professionals in healthcare organizations, bank loan officers, real estate brokers, risk managers, government affairs officers, management consultants advising organizations, development officers working on planned giving, and software entrepreneurs. They desire to know more about the law and to be able to deal more effectively with the lawyers with whom they interact during their professional lives. The degree includes concentrations in human resources law, business law, intellectual property law, health law, and public law and policy.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundation Courses

Code	Title	Hours
LS 6101	Introduction to Legal Studies 1: Law and Legal Reasoning	3
LS 6102	Introduction to Legal Studies 2	3

Core Courses

Code	Title	Hours
Complete at least four of the following:		12-18
LS 6110	Law of Information and Records	
LS 6120	Law and Strategy	
LS 6130	Negotiation and Advocacy	
LS 6140	Data Regulation and Compliance	
LS 6150	Law and Organizational Management	
LS 6155	Legal Foundations of Public Policy	

Electives

Code	Title	Hours
Students who do not take a concentration must take 6–12 semester hours from this list to complete the degree:		6-12
LS 6160	Regulation and Global Business Strategies	
LS 6170	Financial Transactions	
LS 6180	Health Law Survey	
LS 6181	Healthcare Regulation and Compliance	
LS 6182	Patient Records, Privacy, and Security	
LS 6210	Special Topics in Employee Rights and Employer Obligations	
LS 6211	Antidiscrimination Law	
LS 6212	Wages and Benefits	
LS 6230	Intellectual Property Survey	
LS 6231	Identifying and Securing Intellectual Property Rights	
LS 6232	Intellectual Property and Media	
LS 6235	Current Issues in Law and Public Policy	

Concentration Options

Students may choose to complete one of the concentrations described below. Students who pursue a concentration must take the two required foundation courses, at least four core courses, the courses listed in the concentration, and at least one additional course from the list of electives.

CONCENTRATION IN BUSINESS LAW

Code	Title	Hours
LS 6160	Regulation and Global Business Strategies	3
LS 6170	Financial Transactions	3
LS 6230	Intellectual Property Survey	3
or LS 6210	Special Topics in Employee Rights and Employer Obligations	

CONCENTRATION IN HEALTH LAW

Code	Title	Hours
LS 6180	Health Law Survey	3
LS 6181	Healthcare Regulation and Compliance	3
LS 6182	Patient Records, Privacy, and Security	3

CONCENTRATION IN HUMAN RESOURCES LAW

Code	Title	Hours
LS 6210	Special Topics in Employee Rights and Employer Obligations	3
LS 6211	Antidiscrimination Law	3
LS 6212	Wages and Benefits	3

CONCENTRATION IN INTELLECTUAL PROPERTY LAW

Code	Title	Hours
LS 6230	Intellectual Property Survey	3
LS 6231	Identifying and Securing Intellectual Property Rights	3
LS 6232	Intellectual Property and Media	3

CONCENTRATION IN PUBLIC LAW AND POLICY

Code	Title	Hours
LS 6155	Legal Foundations of Public Policy	3
LS 6235	Current Issues in Law and Public Policy	3

Complete one of the following:

Code	Title	Hours
LPSC 7311	Strategizing Public Policy	
PPUA 6500	Principles of Public Administration	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6507	Institutional Leadership and the Public Manager	

30 total semester hours required
Minimum 3.000 GPA required

The Master of Science in Media Advocacy places particular focus on developing direct and indirect advocacy skills: that is, to influence government decision makers directly and to change minds indirectly through shifting public opinion. The program uniquely combines grounding in governmental structures and the legal system with sophisticated training in the latest communication techniques including social media, web communications, and videography, as well as data analytics and data-driven storytelling. Successful graduates will be empowered to promote the public agenda of employers ranging from mission-driven organizations, such as the ACLU or the Sierra Club, to industry leaders, such as hospitals and technology companies, to lobbying and strategic communications groups and political consulting firms.

Core Requirements

Code	Title	Hours
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 5480	Research for Media Strategy	4
LW 6400	Law, Policy and Legal Argument	4
LW 7667	Law and Ethics of Advocacy	3

Code	Title	Hours
A minimum of 17 credits of electives is required. No more than 8 semester hours can be taken outside of the College of Arts, Media, and Design or the School of Law.		17

Complete a minimum of 4 semester hours of coursework from the College of Arts, Media, and Design. Choose from recommended focus areas of JRNL, ARTD, ARTG, COMM, and INAM (additional areas may be chosen in consultation with your adviser).

Complete a minimum of 5 semester hours of coursework from the School of Law.

32 total semester hours required
Minimum 3.000 GPA required

Sample One-and-a-Half Years with No Co-op

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 5400		4 JRNL 5480		4 Vacation		0 Vacation	0
LW 6400		4 Elective 2		3-4			
Elective 1		3-4 Elective 3		3-4			
	11-12		10-12		0		0

Fall	Hours
LW 7667	3
Elective 4	3-4
Elective 5	3-4
Elective 6	3-4
12-15	

Total Hours: 33-39

Graduate Certificates

- Business Law (Boston) (p. 973)
- Healthcare Compliance (Boston) (p. 973)
- Health Law (Boston) (p. 974)
- Human Resources Law (Boston) (p. 976)
- Intellectual Property Law (Boston) (p. 977)
- United States Law (Boston) (p. 981)

The School of Law also offers the following interdisciplinary certificates (<https://law.northeastern.edu/academics/programs/jd/jdx-certificates/>) to students enrolled in its JD program:

- Health Law and Policy (Boston) (p. 975)
- Human Rights Law (Boston) (p. 976)
- Legal Design (Boston) (p. 978)
- Poverty Law and Economic Justice (Boston) (p. 979)
- Privacy Law (Boston) (p. 981)
- Women, Gender, Sexuality, and the Law (Boston) (p. 982)

Business Law, Graduate Certificate (Boston)

The Graduate Certificate in Business Law is designed to provide professionals in large and small enterprises with an ability to recognize, navigate, and leverage the laws that regulate business organizations and transactions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Requirements

Code	Title	Hours
Students enrolled in Northeastern University colleges other than the School of Law should contact a School of Law advisor at lawstudentaffairs@northeastern.edu for guidance on registering for courses from the School of Law.		
LS 6102 or LW 6102	Introduction to Legal Studies 2 Introduction to Legal Studies 2	3
LS 6160 or LW 6160	Regulation and Global Business Strategies Regulation and Global Business Strategies	3
LS 6170 or LW 6170	Financial Transactions Financial Transactions	3
Complete one of the following:		3
LS 6210 or LW 6210	Special Topics in Employee Rights and Employer Obligations Special Topics in Employee Rights and Employer Obligations	
LS 6230 or LW 6230	Intellectual Property Survey Intellectual Property Survey	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Healthcare Compliance, Graduate Certificate (Boston)

The Graduate Certificate in Healthcare Compliance is designed to give law students, MBA students, and working professionals tools they need to successfully navigate the world of healthcare compliance. This 15-credit, one-year program jointly offered by the School of Law and the D'Amore-McKim School of Business gives students the opportunity to learn about the laws that govern the healthcare system while developing the business knowledge and skills critical to healthcare compliance.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Requirements

Code	Title	Hours
Required Courses		
Students enrolled in Northeastern University colleges other than the School of Law should contact a School of Law advisor at lawstudentaffairs@northeastern.edu for guidance on registering for courses from the School of Law.		
LS 6182	Patient Records, Privacy, and Security	3
or LW 6182	Patient Records, Privacy, and Security	
Complete one of the following:		3
HINF 5105	The American Healthcare System (MBA students should take this course)	
LAW 7335	Health Law (Law students should take this course)	
or LW 7335	Health Law	
LS 6180	Health Law Survey	
or LW 6180	Health Law Survey	
Elective		
Complete three of the following:		9
FINA 6200	Value Creation through Financial Decision Making	
HRMG 6220	Health Organization Management	
LAW 7344	Accounting/Finance for Lawyers	
LAW 7494	Bioethics and the Law	
or LW 7494	Bioethics and the Law	
LAW 7619	Healthcare Fraud and Abuse Law	
LS 6110	Law of Information and Records	
or LW 6110	Law of Information and Records	
LS 6120	Law and Strategy	
or LW 6120	Law and Strategy	
LS 6140	Data Regulation and Compliance	
or LW 6140	Data Regulation and Compliance	
PHTH 5232	Evaluating Healthcare Quality	
SCHM 6223	Managing Healthcare Supply Chain Operations	
STRT 6220	Strategic Management for Healthcare Organizations	

Program Credit/GPA Requirements

15 total semester hours required
Minimum 3.000 GPA required

Health Law, Graduate Certificate (Boston)

Healthcare is a complex legal arena, as it encompasses several key stakeholders, from providers to patients to insurers. The Graduate Certificate in Health Law can help individuals recognize and navigate the varying legal needs in this space; an introductory course is paired with three courses tailored to the health industry.

The program helps to prepare graduates with the knowledge and skills to:

- Summarize and apply the appropriate statutes and regulations to concrete situations
- Examine legal regulations governing the provision and financing of healthcare services
- Gain an in-depth overview of health and compliance programs and the code of conduct for particular fields

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Requirements

Code	Title	Hours
Students enrolled in Northeastern University colleges other than the School of Law should contact a School of Law advisor at lawstudentaffairs@northeastern.edu for guidance on registering for courses from the School of Law.		
LS 6102	Introduction to Legal Studies 2	3
or LW 6102	Introduction to Legal Studies 2	
LS 6180	Health Law Survey	3

or LW 6180	Health Law Survey	
LS 6181	Healthcare Regulation and Compliance	3
or LW 6181	Healthcare Regulation and Compliance	
LS 6182	Patient Records, Privacy, and Security	3
or LW 6182	Patient Records, Privacy, and Security	

Program Credit/GPA Requirements

12 total credits required

Minimum 3.000 GPA required

Health Law and Policy, Graduate Certificate (Boston)

The Graduate Certificate in Health Law and Policy, open to all JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of health law and policy.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Law Courses

Code	Title	Hours
LAW 7335	Health Law	3
Code	Title	Hours
In addition, complete one of the following:		3-8
LAW 7410	Domestic Violence Clinic	
LAW 7469	Disability Law	
LAW 7494	Bioethics and the Law	
LAW 7512	Problems in Public Health Law	
LAW 7527	Public Health Advocacy Clinic	
LAW 7588	Reproductive Rights, Justice, and Health	
LAW 7606	Drug Law and Policy	
LAW 7619	Healthcare Fraud and Abuse Law	

Required Non-Law Courses

Code	Title	Hours
Complete at least two courses totaling at least 6 semester hours from the following:		6-8
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6350	Public Health Surveillance and Informatics	
HLTH 5600	Introduction to Patient Safety	
HLTH 5700	Social Determinants of Health	
HRMG 6220	Health Organization Management	
PHTH 5120	Race, Ethnicity, and Health in the United States	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	
PHTH 5222	Health Advocacy	
PHTH 5226	Management and Leadership in Public Health and Healthcare	
PHTH 5230	Global Health	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5300	Project Management in Public Health	
PHTH 5310	Budget Principles in Public Health	
PHTH 5320	Grant Writing in Public Health	
PHTH 6200	Principles and History of Urban Health	
PHTH 6204	Society, Behavior, and Health	
PHTH 6208	Foundations of Community Health Assessment	
PHTH 6224	Social Epidemiology	

PPUA 5240	Health Policy and Politics
SOCL 7267	Environment, Health, and Society
STRT 6220	Strategic Management for Healthcare Organizations

Additional Requirements

Co-op Requirement: Students must complete at least one co-op related to the certificate topic.

Writing Requirement: Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's Student Information Handbook.

Program Credit/GPA Requirements

12 total semester hours required, including at least 6 semester hours of LAW courses and at least 6 semester hours of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

Human Resources Law, Graduate Certificate (Boston)

The workplace has drastically changed in the past decade and keeps on evolving. This leads to many new human resources legal and regulation challenges. The Graduate Certificate in Human Resources Law is designed to provide professionals who work in human resources with the skills needed to recognize and navigate the many legal issues that arise within this heavily regulated field.

The program helps to prepare graduates with the knowledge and skills to:

- Summarize and apply the appropriate statutes and regulations to concrete situations
- Examine laws and regulations governing the management of people resources
- Gain an in-depth overview of human resources compliance programs and policies
- Leverage specialized knowledge in human resources law and regulations to achieve personal and institutional goals

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Requirements

Code	Title	Hours
Students enrolled in Northeastern University colleges other than the School of Law should contact a School of Law advisor at lawstudentaffairs@northeastern.edu for guidance on registering for courses from the School of Law.		
LS 6102 or LW 6102	Introduction to Legal Studies 2 Introduction to Legal Studies 2	3
LS 6210 or LW 6210	Special Topics in Employee Rights and Employer Obligations Special Topics in Employee Rights and Employer Obligations	3
LS 6211 or LW 6211	Antidiscrimination Law Antidiscrimination Law	3
LS 6212 or LW 6212	Wages and Benefits Wages and Benefits	3

Program Credit/GPA Requirements

12 total credits required

Minimum 3.000 GPA required

Human Rights Law, Graduate Certificate (Boston)

The Graduate Certificate in Human Rights Law, open to JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of human rights law.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required LAW Courses

Code	Title	Hours
Complete one of the following:		3
LAW 7491	International Human Rights and the Global Economy	
LAW 7651	Human Rights in the United States	
In addition, complete one of the following:		3
LAW 7338	International Law	
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7651	Human Rights in the United States	
LAW 7696	Federal Indian Law	
LAW 7697	Issues in Human Rights and Humanitarian Law	

Required Non-LAW Courses

Code	Title	Hours
Complete two of the following:		6-8
ARTG 6460	Human-Centered AI	
CRIM 5201	Global Criminology	
PHIL 5001	Global Justice	
PHTH 5230	Global Health	
POLS 7325	Contemporary Issues in Third World Development	
POLS 7387	Global Governance	
PPUA 5268	International Environmental Policy	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6232	Designing Global Economic and Social Policy	
SOCL 7221	Globalization, Development, and Social Justice	
Another 2-4 semester hour human rights law-related course from subject codes other than LAW, LW, or LS, with pre-approval of the certificate advisor.		

Additional Requirements

Co-op Requirement: Students must complete at least one co-op related to the certificate topic. Consult an advisor about the applicability of the JD co-op.

Writing Requirement: Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's *Student Information Handbook*.

Program Credit/GPA Requirements

A minimum of 12 total semester hours required, including at least 6 credits of LAW courses and at least 6 credits of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

Intellectual Property Law, Graduate Certificate (Boston)

The Graduate Certificate in Intellectual Property Law is designed to provide professionals who work in intellectual property, technology transfer, licensing, or related areas, as well as inventors and entrepreneurs, with the skills they need to recognize and protect intellectual property rights.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Requirements

Code	Title	Hours
Students enrolled in Northeastern University colleges other than the School of Law should contact a School of Law advisor at lawstudentaffairs@northeastern.edu for guidance on registering for courses from the School of Law.		
LS 6102	Introduction to Legal Studies 2	3
or LW 6102	Introduction to Legal Studies 2	
LS 6230	Intellectual Property Survey	3

or LW 6230	Intellectual Property Survey	
LS 6231	Identifying and Securing Intellectual Property Rights	3
or LW 6231	Identifying and Securing Intellectual Property Rights	
LS 6232	Intellectual Property and Media	3
or LW 6232	Intellectual Property and Media	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Legal Design, Graduate Certificate (Boston)

The Graduate Certificate in Legal Design, open to JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of legal design.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required LAW Courses

Requires 6 semester hours of LAW courses.

Code	Title	Hours
Complete at least one of the following:		2-4
LAW 7635	Laboratory Seminar in Applied and Critical Legal Design	
LAW 7698	AI for Lawyers: Uses, Risks, and Regulation	
LAW 7703	Spatial Justice, Legal Ethnography, and the Lawscape	

Code	Title	Hours
Complete at least one of the following:		2-4
LAW 7369	Intellectual Property	
LAW 7501	Patent Law	
LAW 7614	Law Practice Management: Access to Justice	
LAW 7620	Human Behavior, Legal Doctrine, and Policy Design	
LAW 7624	Advanced Legal and Interdisciplinary Research	
LAW 7669	Law and Technology	
LAW 7692	Collaborative Businesses	
LAW 7700	Intellectual Property and Social Justice	
LAW 7705	Law and Global Technology	

Required Non-LAW Courses

Requires 6 semester hours of non-LAW courses.

Code	Title	Hours
Complete at least two courses totaling at least 6 semester hours from the following:		7-8
ARTG 5110	Information Design History	
ARTG 5120	Research Methods for Design	
ARTG 5150	Information Visualization Principles and Practices	
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics for Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5640	Prototyping for Experience Design	
ARTG 5910	Human-Centered Design	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6460	Human-Centered AI	

ARTG 6600	Experience Design Studio 2: Group and Interpersonal
ARTG 7100	Critical Design and Research Seminar
COMM 6304	Communication and Inclusion
GSND 5110	Game Design and Analysis
GSND 6320	Psychology of Play
GSND 6340	Biometrics of Design
INAM 6100	Critical Foundations of Creative Practice
JRNL 5500	Coding for Digital Storytelling
JRNL 6341	Telling Your Story with Data
PPUA 5246	Participatory Modeling for Collaborative Decision Making
PPUA 5269	Social Policy: Design, Implementation, and Critique
THTR 6100	Advanced Creative Storytelling for Social Engagement
Another 2-4 semester hour legal design-related course from subject codes other than LAW, LW, or LS, with pre-approval of the certificate advisor.	

Additional Requirements

Co-op Requirement: Students must complete at least one co-op related to the certificate topic.

Writing Requirement: Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and has a clear connection to the certificate topic or significantly advances a legal innovation project using legal design methods.

For additional information on requirements associated with this certificate, please consult the JD program's *Student Information Handbook*.

Program Credit/GPA Requirements

A minimum of 12 total semester hours is required, including at least 6 semester hours of LAW courses and at least 6 semester hours of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

Poverty Law and Economic Justice, Graduate Certificate (Boston)

The Graduate Certificate in Poverty Law and Economic Justice, open to all JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of poverty law and economic justice.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Law Courses

Code	Title	Hours
Complete one of the following:		3-8
LAW 7358	Social Welfare Law	
LAW 7424	Labor Law 1	
LAW 7525	Law and Economic Development	
LAW 7664	Law and Inequality	
LAW 7684	Anatomy of Autonomy	

Code	Title	Hours
In addition, complete one of the following:		3-8
LAW 7333	Family Law	
LAW 7335	Health Law	
LAW 7336	Immigration Law	
LAW 7350	Negotiation	
LAW 7358	Social Welfare Law	
LAW 7410	Domestic Violence Clinic	
LAW 7428	State Local Government	
LAW 7448	Employment Discrimination	
LAW 7469	Disability Law	
LAW 7488	Sexuality, Gender, and the Law	

LAW 7491	International Human Rights and the Global Economy
LAW 7512	Problems in Public Health Law
LAW 7525	Law and Economic Development
LAW 7527	Public Health Advocacy Clinic
LAW 7530	Education Law
LAW 7535	Legal Interviewing and Counseling
LAW 7540	Employment Law—Compensation, Benefits, and Retirement
LAW 7550	Refugee and Asylum Law
LAW 7588	Reproductive Rights, Justice, and Health
LAW 7597	Civil Rights and Restorative Justice Clinic
LAW 7606	Drug Law and Policy
LAW 7607	Consumer Law
LAW 7608	American Legal Thought: Traditional and Critical
LAW 7610	Community Business Law Clinic
LAW 7657	Immigrant Justice Clinic
LAW 7664	Law and Inequality
LAW 7679	Race and the Law
LAW 7684	Anatomy of Autonomy

Required Non-Law Courses

Code	Title	Hours
Complete one of the following:		4
PPUA 5245	Education Policy in the United States	
PPUA 5270	Food Systems and Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7227	Race and Ethnic Relations	
SOCL 7263	Social Psychology of Stratification	

Code	Title	Hours
In addition, complete one of the following:		4
LPSC 5201	Law and the City	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PPUA 5245	Education Policy in the United States	
PPUA 5270	Food Systems and Public Policy	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7227	Race and Ethnic Relations	
SOCL 7263	Social Psychology of Stratification	

Additional Requirements

Co-op Requirement: Students must complete at least one co-op related to the certificate topic.

Writing Requirement: Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's *Student Information Handbook*.

Program Credit/GPA Requirements

Minimum 12 total credits required, including at least 6 credits of LAW courses and at least 6 credits of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

Privacy Law, Graduate Certificate (Boston)

The Graduate Certificate in Privacy Law, open to all JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of privacy law.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required LAW Courses

Code	Title	Hours
Complete at least two courses totaling at least 6 semester hours from the following:		6
LAW 7640	Information Security Law	
LAW 7672	Data Privacy Compliance in the 21st Century	
LAW 7675	Information Privacy Law	
LAW 7698	AI for Lawyers: Uses, Risks, and Regulation	

Required Non-LAW Courses

Code	Title	Hours
Complete at least two courses totaling at least 6 semester hours from the following list:		6
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5102	Data Management in Healthcare	
HINF 5300	Personal Health Interface Design and Development	
JRNL 6202	Perspectives on News Media Ethics and Diversity	
MKTG 6210	Marketing Research	
MKTG 6222	Digital Marketing	
MKTG 6226	Consumer Behavior	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
POLS 7334	Social Networks	
POLS 7341	Security and Resilience Policy	
PPUA 5262	Big Data for Cities	

Additional Requirements

Co-op Requirement: Students must complete at least one co-op related to the certificate topic.

Writing Requirement: Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's Student Information Handbook.

Program Credit/GPA Requirements

12 total semester hours required, including at least 6 semester hours of LAW courses and at least 6 semester hours of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

United States Law, Graduate Certificate (Boston)

The Graduate Certificate in United States Law offers an introduction to U.S. law for students who have completed their law degree in countries other than the United States. The asynchronous, online format provides flexibility for students seeking to expand their knowledge of law.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundational Course

Code	Title	Hours
LAW 6400	Introduction to U.S. Law and Legal System	3

Electives

Code	Title	Hours
Complete at least 10 credits of electives from the following:		10
LAW 6401	Contracts	
LAW 6402	Torts	
LAW 6403	Constitutional Law	
LAW 6404	Civil Procedure	
LAW 6405	Professional Responsibility	
LAW 7000	Copyright	
LAW 7004	Trademark	
LAW 7005	Mergers and Acquisitions	
LAW 7006	Secured Transactions	
LAW 7007	Securities Regulation	
LAW 7009	Intellectual Property and Technology Law	
LAW 7010	Insurance Law	
LAW 7011	Personal Income Tax	
LAW 7012	Introduction to Business Organizations	
LAW 7672	Data Privacy Compliance in the 21st Century	

Program Credit

13 total hours required

Women, Gender, Sexuality, and the Law, Graduate Certificate (Boston)

The Graduate Certificate in Women, Gender, Sexuality, and the Law, open to all JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the area of women, gender, sexuality, and the law.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Law Courses

Code	Title	Hours
Take at least two courses totaling at least 6 semester hours from the following list:		6
LAW 7410	Domestic Violence Clinic	
LAW 7488	Sexuality, Gender, and the Law	
LAW 7588	Reproductive Rights, Justice, and Health	
LAW 7651	Human Rights in the United States	
LAW 7664	Law and Inequality	
LAW 7679	Race and the Law	
LAW 7684	Anatomy of Autonomy	

Required Non-Law Courses

Code	Title	Hours
Take at least two courses totaling at least 6 semester hours from the following list:		6
ECON 5292	Gender and Development Economics	
INTL 5010	International Human Rights Law and Policy	
SOCL 7231	Sociology of Prejudice and Violence	
WMNS 5240	Feminist Resistance	
WMNS 6100	Theorizing Gender and Sexuality	
WMNS 7100	Queer Theory: Sexualities, Genders, Politics	

Additional Requirements

Co-op Requirement: Students must complete at least one co-op related to the certificate topic.

Writing Requirement: Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's Student Information Handbook.

Program Credit/GPA Requirements

12 total credit hours required, including at least 6 credit hours of LAW courses and at least 6 credit hours of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

Accelerated Degrees

The School of Law offers a PlusJD pathway that allows students to accelerate the attainment of the JD degree by applying School of Law coursework completed as an undergraduate toward both the undergraduate and JD degrees. Students pursuing the PlusJD pathway are expected to complete all undergraduate degree requirements before they begin their first-year JD courses, with the exception of requirements that may be fulfilled by these JD courses. Interested students should consult their advisor during their freshman or sophomore years. See the PlusJD program (<https://law.northeastern.edu/admissions/jd/application-process/plusjd/>) for additional information.

Dual Degrees

- Law, JD / Accounting and Business Administration, MSAMBA (Boston) (p. 305)
- Law, JD / Business Administration, MBA—Full-Time (Boston) (p. 305)
- Law, JD / Criminology and Justice Policy, PhD (Boston) (p. 984)
- Law, JD / Criminology and Criminal Justice, MS (Boston) (p. 984)
- Law, JD / Public Health, MPH (Boston) (p. 810)
- Law, JD / Public Policy, MPP (Boston) (p. 984)
- Law, LLM / Business Administration, MBA—Full-Time (Boston) (p. 305)

Law, JD / Accounting and Business Administration, MSAMBA (Boston)

The Northeastern University School of Law and the D'Amore-McKim School of Business offer a combined degree that results in a Juris Doctor and Master of Science in Accounting and Business Administration. Students without a previous accounting background study how to operate effectively in specialized fields such as taxation law, corporate finance, or mergers and acquisitions. Students have an opportunity to gain advanced legal expertise alongside future-forward accounting and business knowledge.

Our combined degree program is a full-time, four-year course of study. Students usually complete two years of the law curriculum, followed by 15 months of the combined accounting and business administration curriculum, before returning to finish their studies at the School of Law.

Students gain valuable work experience in law and public accounting before they graduate. They can make a real impact during two co-ops in legal departments, law firms, government agencies, judges' chambers, or other legal settings. Students also experience working as an accounting associate during the busy tax season through a corporate residency at Big 4 or other globally known accounting firms.

Students concurrently pursue the two degrees and may count 12 semester hours of nonlaw coursework from the accounting and business administration curriculum toward the law curriculum. The corporate residency at an accounting firm may fulfill the requirement for the third co-op required for the law curriculum. Students are encouraged to consult their law advisor to select accounting and business classes that satisfy JD requirements.

Law, JD / Business Administration, MBA—Full-Time (Boston)

The JD/MBA dual degree is offered through a partnership between Northeastern University School of Law and the D'Amore-McKim School of Business to position students to operate in increasingly interdependent legal and business spheres. As new technology disrupts industries and data availability and sophisticated use shifts the business landscape, our JD/MBA (<https://damore-mckim.northeastern.edu/programs/jd-mba/>) students prepare to guide corporate-level strategy and become the leaders businesses need.

Our JD/MBA program is a full-time, four-year course of study that includes three semester-long co-op work experiences arranged through Northeastern Law. Students complete three years of law school, taking a break after either year one or two to complete a year of business courses.

Students specialize their program by selecting two in-demand business concentrations from the D'Amore-McKim School of Business. Or, they may add expertise in another professional area by selecting an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

Students concurrently pursue the two degrees and may count 9 semester hours of nonlaw coursework from the JD curriculum toward the interdisciplinary and elective requirements of the MBA degree and up to 12 semester hours from the MBA curriculum toward the JD degree. Students should work with their MBA advisor to select JD courses that will fulfill MBA requirements and with their law advisor to choose MBA courses that will satisfy JD requirements.

Law, JD / Criminology and Justice Policy, PhD (Boston)

The JD/PhD program will expand the knowledge base and career options of students. The disciplines of criminology and justice policy and law share common interests in identifying opportunities to create conditions for justice, equality, and societal well-being. The dual degree will provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the sociopolitical, legal, and economic context in which they are found. Solving problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

Up to 16 credits of coursework in the dual-degree program can be counted toward both the JD degree and the PhD degree. Of these 16 credits, no more than 12 credits of non-law courses can count toward the JD degree.

Students will take law courses during semesters spent in the law school. Students will take criminology courses during semesters spent in SCCJ. Please consult the School of Law (<https://www.northeastern.edu/law/>) for more information about JD requirements. Additionally, please consult SCCJ (<https://cssh.northeastern.edu/sccj/>) for more information about PhD requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, JD / Criminology and Criminal Justice, MS (Boston)

The JD/MS program will expand the knowledge base and career options of students. The disciplines of criminal justice and law share common interests in identifying opportunities to create the conditions for justice, social equality, and societal well-being. The dual degree is designed to provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the social, political, legal, economic context in which they are found. Solving these problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

Up to 16 credits of coursework in the dual-degree program can be counted toward both the JD degree and the MS degree. Of these 16 credits, no more than 12 credits of non-law courses can count toward the JD degree.

Students will take law courses during semesters spent in the School of Law. Students will take criminology courses during semesters spent in the School of Criminology and Criminal Justice. Please consult the School of Law (<https://www.northeastern.edu/law/>) for more information about JD requirements. Additionally, please consult SCCJ (<https://cssh.northeastern.edu/sccj/>) for more information about MS requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, JD / Public Health, MPH (Boston)

Northeastern University's School of Law and Bouvé College of Health Sciences offer a JD/MPH dual degree. Given the worldwide trend toward urbanization, the Master of Public Health (MPH) recognizes the growing need for professionals trained to respond to unique public health challenges and opportunities facing urban populations. The MPH program brings together interdisciplinary faculty (from the School of Law, D'Amore-McKim School of Business, College of Social Sciences and Humanities, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences) with expertise in collaborating with diverse urban populations to offer students an opportunity to obtain practice-based knowledge, skills, and experience needed to address public health problems.

Up to 9 credit hours of coursework in the JD program may count toward the MPH, while up to 12 credit hours of coursework in the MPH program may count toward the JD. See the JD/MPH program page (<https://law.northeastern.edu/academics/programs/jd/dual-degrees/public-health-bouve/>) for more information.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, JD / Public Policy, MPP (Boston)

The JD/Master of Public Policy (MPP) is designed to equip graduates with a unique blend of skills for navigating a complex and rapidly changing policy landscape. The program builds on students' legal training with a compelling blend of skills in applied public policy analysis, policy design, and strategic policy formation. Students also gain career-relevant experience through internships, small group capstone projects, and other

interactions with professionals in the field. All are part of a learning process designed to enable the Northeastern law and public policy graduates to navigate, and to redefine, diverse policy areas.

Ideally, students would apply to Northeastern's JD and MPP programs simultaneously. Those who apply and are admitted to both programs take MPP classes after completing their first year in the School of Law. Applicants may also be considered after they have enrolled in the JD program; interested JD students should consult the School of Law's Office of Academic and Student Affairs and the School of Public Policy and Urban Affairs graduate program director for more information.

Students enrolled in this dual-degree program will be able to count 8 JD credit hours toward their MPP degree and 12 MPP credit hours toward their JD degree. Students should consult advisors in each program if they have questions about which courses may be shared between degrees.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, LLM / Business Administration, MBA—Full-Time (Boston)

Law, LLM / MBA

The LLM/MBA dual degree is offered through a partnership between Northeastern University School of Law and the D'Amore-McKim School of Business to position students to harness legal and business skills to serve their clients' needs. In the LLM/MBA (<https://damore-mckim.northeastern.edu/programs/llm-mba/>) program, students prepare to assume leadership positions where they'll navigate complex legal issues, answer their clients' calls for legal expertise, and engage as partners to develop new models for businesses, nonprofit organizations, and governments worldwide.

The LLM/MBA program is a full-time, 20-month course of study. Students start taking classes in business school, take law courses next, and finish with business courses.

Students specialize their program by selecting two in-demand business concentrations from the D'Amore-McKim School of Business. Or, they could add expertise in another professional area by choosing an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

Students concurrently pursue the two degrees and may be able to count up to 12 semester hours of coursework toward both degrees. Students should consult their MBA and LLM program advisors for more information.

Law, LLM—Experiential / MBA

The LLM/MBA dual degree is offered through a partnership between Northeastern Law and the D'Amore-McKim School of Business to position students to harness business and legal skills to serve their clients' needs. In the LLM/MBA (<https://damore-mckim.northeastern.edu/programs/llm-mba/>) program, students prepare to assume leadership positions where they'll navigate complex legal issues, answer their clients' calls for legal expertise, and engage as partners to develop new models for businesses, nonprofit organizations, and governments worldwide.

The LLM/MBA program is a full-time, two-year course of study that includes a semester-long co-op work experience arranged through Northeastern Law. During the course of their studies, students take classes in business school and the School of Law and complete a law co-op.

Students specialize their degree by selecting two in-demand business concentrations from the D'Amore-McKim School of Business. Or, they could add expertise in another professional area by selecting an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

Students will concurrently pursue the two degrees and may be able to count up to 12 semester hours of coursework toward both degrees. Students should consult their MBA and LLM program advisors for more information.

College of Professional Studies

Website (<https://cps.northeastern.edu>)

Jared Auclair, PhD, Dean of the College of Professional Studies

Joseph Griffin, DMin, PMP ®, Senior Associate Dean of Academic Affairs

Sara Ewell, PhD, Associate Dean of Faculty Affairs

Corliss Thompson, PhD, Associate Dean of Graduate School of Education

Christopher Bolick, EdD, Associate Dean of Graduate Programs

Erin Clair, PhD, Associate Dean of Undergraduate Programs

Molly Smith, PhD, Associate Dean of University Pathway Programs

877.668.7727

617.373.2400

Academic Policies and Procedures

- Academic Progression Standards (p. 987)
- Academic Resources (p. 988)
- Active-Duty Military Personnel (p. 988)
- Attendance Verification (p. 988)
- Completing Degree Requirements (p. 989)
- Degrees, Majors, and Concentrations (p. 989)
- Full-Time Status (p. 989)
- Global Partnership Programs (p. 990)
- Graduate Campus (p. 990)
- Master's Degree Admission Requirements (p. 990)
- New Student Orientation (On-Ground and Online) (p. 991)
- Personal Professional Enrichment (PPE) (p. 991)
- Readmission to Program (p. 991)
- Reentry to Program (p. 991)
- Registration and Taking Courses (p. 991)
- Reinstatement after Academic Dismissal (p. 993)
- Seeking More than One Certificate or Degree (p. 993)
- Special Student Status (p. 994)
- Student Evaluation of Courses (p. 994)
- Transfer Credit Policies (p. 994)

Academic Progression Standards

Academic Progress/Standing

To be in good standing, a graduate student must continuously maintain a minimum cumulative grade-point average of 3.000 on a 4.000 scale and must also make continuous satisfactory academic progress. To make SAP, a student must earn at least 66% of their cumulative attempted credits. Nonmatriculated students are required to be in good academic standing to be allowed to register for any subsequent classes.

Students are responsible for reviewing their grades and academic standing at the end of each term through the Student Hub. If there are any discrepancies, students should immediately contact the instructor(s) directly. Students who want to appeal a grade have 30 calendar days from the date the grade is posted to do so.

Academic Probation and Dismissal

Notation of academic probation appears on a student's internal record but not on their permanent transcript.

With exception as specified by the program, a graduate (nondoctoral) student is placed on academic probation if their cumulative GPA is below 3.000 and/or if they do not earn at least 66% of their cumulative attempted credits. The student is strongly encouraged to consult with their academic and career advisor to develop an individualized success plan to improve their academic standing. Otherwise, a registration hold may be placed on the student's account.

A student whose cumulative GPA remains below 3.000, and/or does not earn at least 66% of their cumulative attempted credits in the term of enrollment subsequent to the one after they were placed on academic probation, will be academically dismissed. A student who has been academically dismissed from the college is automatically dismissed from their program of study.

Dismissal Notification

A student will be notified about their dismissal within one week following the end of the term and has the right to appeal the dismissal decision to the college's Academic Standing Committee if they can provide documented evidence supporting an appeal. The notification of dismissal will include the appeal deadline.

Students appealing a dismissal decision may not be eligible to enroll in classes the term following their dismissal to allow time for the appeal process.

Students are responsible for reviewing their grades and academic standing at the end of each term through the Student Hub.

Academic Resources

Interactive Academic Integrity Checklist

The Citation and Academic Integrity Checklist (<https://cps.northeastern.edu/current-students/academic-integrity/>) is a tool students can use before they turn in every assignment to ensure that they have not accidentally committed any of the most common violations of the Academic Integrity Policy. Additionally, the IAC contains links to examples of APA- and MLA-style formatting.

Global Student Success

10 Belvedere
617.373.2455
gss@northeastern.edu

Website (<https://international.northeastern.edu/gss/>)

Global Student Success is committed to supporting the success of international students at Northeastern University through cross-cultural, linguistic, and academic support services. We also partner with faculty, staff, and administrators to integrate global dimensions and cross-cultural understanding into the Northeastern experience.

Online Writing Lab

Website (<https://cps.northeastern.edu/academics/online-writing-center/>)

To provide students with guided writing support, the College of Professional Studies created the Online Writing Lab (<https://cps.northeastern.edu/academics/online-writing-center/>) as laboratory courses and attached them to six undergraduate courses and one graduate course. Students submit all of their essays to their writing specialists in the labs and then receive sophisticated revision and editing strategies to help them improve their essays before submission for a final grade. Students obtain strategies to help them focus, develop, edit, and refine their writing.

Tutoring Services

Website (<https://cps.northeastern.edu/academic-resources/tutoring-services/>)

Tutoring can benefit skilled professionals and beginning students alike. Whether you're struggling with organic chemistry, working on a long paper, or putting the finishing touches on a presentation, Northeastern University offers many opportunities for you to enhance your academic work and professional skills through free one-on-one academic support on and off campus.

Active-Duty Military Personnel

As a member of the Service Member Opportunity Colleges, the College of Professional Studies' academic residency requirement is different for active-duty service members. Active-duty service members are required to complete 30% of the graduate certificate/degree program at the College of Professional Studies.

Attendance Verification

"I Am Here" Process

After course registration, students are required to verify their intent to enroll in College of Professional Studies class(es) through the Student Hub (<https://me.northeastern.edu>) beginning four calendar days before the start of the academic term and ending on day two of the term.. This verification process is called "I Am Here." Students who fail to complete this process on time will be dropped from the class(es), which may impact their financial aid or international student visa eligibility.

Students are responsible for ensuring completion of the IAH process, which requires that they do not log out of the system early. Students who do not receive a "Successful Completion" message have not reached the end of the procedure and must start again. Sometimes it may take 24 hours before students can restart the procedure.

A student who registers for a course and completes the IAH process but does not officially drop the course by the deadline, regardless of their level of participation or attendance/nonattendance, is responsible for paying 100% of the tuition charges and applicable fees and the final earned grade. A student in this situation may earn an F grade that will be part of their permanent academic record.

Students registering for the first time after the start of classes will have access to complete IAH the following day.

Students who experience difficulty with the process or have questions should request support through the Registrar Services portal (<https://service.northeastern.edu/registrar/>).

Completing Degree Requirements

Graduate and Doctoral Degree Programs

To earn a graduate or doctoral degree, students must complete all courses as prescribed in the curriculum; the required number of credits as per the curriculum; applicable thesis or dissertation; the residency requirement; and maintain a minimum cumulative grade-point average of 3.000 or as outlined by the specific program.

Graduate Certificate Programs

To earn a graduate certificate, students must complete all courses as prescribed in the curriculum; the required number of credits as per the curriculum; the residency requirement; and maintain a minimum cumulative GPA of 3.000 or as outlined by the specific program.

Time Limit on Courses

Graduate course credits earned in the academic program or accepted by transfer are valid for a maximum of seven years.

Time Limit on Program Completion

- Graduate certificate students have up to three full years from the time of the first term of enrollment to complete the program.
- Master's degree students have up to seven full years from the time of the first term of enrollment to complete the program.
- Doctoral degree students, with the exception of the Transitional Doctor of Physical Therapy, have up to seven full years from the time of the first term of enrollment to complete the program.
- Transitional Doctor of Physical Therapy students have up to four full years from the time of the first term of enrollment to complete the program.

Note: The College of Professional Studies makes adjustments to its academic program offerings and curricula to stay current and to be able to offer students the most relevant courses and knowledge in the field. Examples of such changes include adding new programs, adding/adjusting course requirements, adding/adjusting courses, and adding/adjusting curriculum requirements.

When there is a change to a curriculum or program requirement, students already matriculated and actively enrolled in the program may continue to follow the program requirements at the time of matriculation or to follow the new curriculum/program requirements, unless it is otherwise specified by the academic program at the time of the announcement of said changes.

Degrees, Majors, and Concentrations

Change of Major/Program of Study

A graduate (nondoctoral) student matriculated in a certificate/degree program who would like to enroll in a different graduate program, after consulting with their academic advisor, must apply to the intended program by submitting the Change of Major form.

Previously awarded transfer credit awards are subject to change as a result of a program change. Students on financial aid or an international student visa are responsible for understanding the impact that results from a program change.

Doctoral students must consult with their program director or designee.

Concentrations

Only Northeastern University-approved concentrations are noted on a student's official academic record. If a student pursues a customized specialization, no concentration will be noted on their official academic transcript. Students who wish to pursue a customized specialization must consult with their academic advisor and seek approval from the academic program.

Full-Time Status

A graduate (nondoctoral) student's full-time course load is 9 quarter-hours of graduate credit for the quarter. An exception is made for students matriculated in master's degree programs that only require 4-credit courses, in which case full-time student status is attained with enrollment in 8 quarter-hours of graduate credit for the quarter.

A doctoral student's full-time course load is determined by the structure of the program.

Note that full-time status may be defined differently for federal loan purposes. International students have other considerations/requirements to maintain their visa eligibility. Visit Student Time Status (p. 130) for information on student time status.

Course Overload

A maximum course load (different from full-time enrollment) for a graduate (nondoctoral) student is 16 credits taken across a 12-week term, with no more than 8 credits per six-week session.

To be eligible for a course overload (greater than 16 credits per 12-week term or greater than 8 credits per six-week session), a graduate (nondoctoral) student must:

- Have a record of successful study with 12 or more credits a term at Northeastern University
- Have a minimum cumulative grade-point average of 3.500
- Provide a rationale to support the request

Students need to complete the appropriate form and return it to their career and academic advisor. Course overload is approved per term.

Each doctoral program has its own enrollment and course load requirements. Doctoral students who wish to seek a course overload must consult with the program director or designee.

International Student Enrollment Requirements

IMPORTANCE OF MAINTAINING F-1 STATUS

International students studying at Northeastern are responsible for maintaining compliance with U.S. federal regulations. Failure to maintain full-time enrollment, in accordance with these regulations, can result in consequences. Regular consultation with college academic advisors, as well as Office of Global Services international student advisors, is required before taking any action that may impact immigration status and educational endeavors in the United States.

ACHIEVING FULL-TIME ENROLLMENT STATUS

Full-time enrollment status must be maintained by F-1 students throughout the academic year. To achieve full-time status, graduate students must be enrolled in 8 to 9 credits throughout each academic term. Students can consult with their college academic advisor prior to each term to develop a course schedule to maintain full-time status. F-1 students are expected to study on-ground and cannot enroll in an online course without first speaking to a college academic advisor to confirm eligibility. If approved, F-1 students who need to withdraw/drop from a course must withdraw/drop from the additional online course first and not from any of the on-ground core courses in order to maintain full-time status.

COLLEGE OF PROFESSIONAL STUDIES ACADEMIC TERM

In CPS, each academic term in fall, winter, and spring is defined as a quarter-term consisting of 12 weeks. Some courses are scheduled for the entire 12 weeks, while others are scheduled for either the first six weeks or the last six weeks (parts of a term). A full summer term consists of eight weeks. Some courses are scheduled for the entire eight weeks of a term, while others are scheduled for parts of a term.

FINAL TERM

F-1 students are required to maintain full-time enrollment status, except in the final academic term of degree completion. If the course requirements for degree completion are less than 8 to 9 credits, they must be completed on-ground throughout the entire final term.

ELIGIBILITY FOR SUMMER TERM OFF

All students, regardless of the term in which they begin studies, (e.g., CPS winter or spring quarter-terms) are eligible to take the summer term off as their standard vacation term, as long as they confirm enrollment in the following fall term and they are not starting or ending their program of study in that same summer term.

Directed Study

Directed studies are offered when a course is required for a student's program of study but said course is not available in a given academic term and there is immediacy for a student to complete said course. Academic deans/directors will make the decision if there is a compelling need to run a course as a directed study.

Global Partnership Programs

Students enrolled in a College of Professional Studies' global partnership are required to abide by the policies and procedures of both institutions or as specified in their program.

Graduate Campus

Students enrolled in a Northeastern University graduate (regional) campus are also required to abide by the policies and procedures specific to that campus.

Master's Degree Admission Requirements

Note that all master's degrees offered through the College of Professional Studies have the following admission requirements:

- Online application
- Statement of purpose (500–1,000 words)
- Professional resumé
- Official undergraduate transcript(s) noting conferral of a bachelor's degree

- Two letters of recommendation
- English-language proficiency proof (for non-native English-language speakers)
- TOEFL, IELTS, Pearson, Duolingo, or TOEIC scores

Some programs have additional requirements.

The college reserves the right to rescind an offer of acceptance if the student is no longer considered in good academic or disciplinary standing between the time of acceptance and matriculation.

New Student Orientation (On-Ground and Online)

New students taking courses on-ground receive an invitation to the on-ground orientation. The purpose of New Student Orientation is to provide information and tools for each student's success from the point of program entry to degree completion. All new students are expected to attend the on-ground orientation. If students cannot attend the on-ground orientation, they should thoroughly review the New Admitted Students (<https://cps.northeastern.edu/current-students/orientation/>) site.

Personal Professional Enrichment (PPE)

Students interested in taking graduate-level (nondoctoral) courses for personal or professional enrichment need to complete an online application (<https://cps.northeastern.edu/admissions-aid/graduate-admissions/>) as PPE students. Once approved, students will be able to register through the Student Hub (<https://me.northeastern.edu>).

- Students on PPE status are expected to satisfy applicable course prerequisites before enrolling in a course.
- Students taking courses while on PPE status may elect to apply to a graduate certificate or degree program by completing the formal application process (<https://cps.northeastern.edu/admissions-aid/graduate-admissions/>). Up to two qualifying courses (or 8 credits) completed while on PPE status may be applied to the intended program of study. To be eligible, the minimum earned grade for the course(s) must be B.
- Students taking courses under PPE status are not eligible for financial aid.

PPE status is not an option for students seeking an F-1 visa.

Readmission to Program

A new admission application is required of students whose studies are interrupted voluntarily for more than three years.

Students are expected to meet the requirements of the program curriculum current at the time of the approved readmission. If the program into which the student is seeking readmission is no longer offered, the student may apply to another program and must meet the admissions requirements for that program. Contact the Office of Admissions (<https://cps.northeastern.edu/admissions-aid/>) for assistance and to complete the admission application.

If readmitted, transfer credits that a student was previously awarded will be reevaluated following the transfer credit award rules current at the time of readmission. It is at the discretion of the academic program to determine applicability of courses previously completed.

Reentry to Program

Application for reentry into any academic program is required of students whose studies are interrupted voluntarily for a period of one to three years. Students who are dismissed academically must wait at least one academic term before applying for reinstatement.

Students are expected to meet the requirements of the program curriculum current at the time of the approved reentry. If a student does not enroll in the term in which they were approved for reentry, they must follow the curriculum requirements for the term in which they resume coursework with approval. If a student waits for more than one year to resume their studies after being approved for reentry, they will have to apply for reentry again.

If the program into which the student is seeking reentry is no longer offered, the student may choose to enroll in another program if they meet the admissions requirements for that program. Contact the Office of Academic Advising (<https://cps.northeastern.edu/academic-resources/advising/>) for assistance and to complete the appropriate form.

Registration and Taking Courses

Course Registration

For course registration information, visit the College of Professional Studies webpage (<https://cps.northeastern.edu/current-students/registering-for-classes/>).

Course registration procedures are as follows:

- Newly accepted and returning students add or drop courses through the Student Hub any time during the registration period.
- Certificate- and degree-seeking students whose studies have been interrupted voluntarily for one to three years or more need to first apply for reentry through the Office of Academic Advising before registering for course(s).
- Global program students should consult with their program to determine if they need to register on their own or if the program will register them.

All students need to be mindful of the college's course add/drop policies and deadlines to register as early as possible with the intent to secure a spot in the preferred course and to avoid being charged in full for missing the course drop/withdrawal deadline.

Auditing a Course

Graduate (nondoctoral) students are permitted to audit graduate (nondoctoral) courses, but they must complete the usual registration process and pay regular tuition fees. There is no reduction in fees for auditing.

An auditor may participate in class discussions, complete papers and projects, and take tests and examinations for informal evaluation. Regardless of the amount or quality of work completed, however, no academic credit will be granted at any time for audited courses. In addition, audited courses may not be used in the determination of enrollment status for financial aid purposes and do not count toward program completion.

The student's decision to audit a course must be communicated in writing to the Office of the University Registrar before the fourth class meeting for 12-week courses. For 4-, 6-, and 8-week courses, requests must be received by the second class meeting. No exception to this procedure may be approved without the authorization of the college's academic standing committee.

If approved, the student should inform the instructor of their status as auditor of the course.

Course Selection and Planning

Students should refer to their degree audits for program curriculum information, to select courses, and to monitor their progress toward degree completion. Students should access their degree audits through the Student Hub or request an audit from their academic advisor. Degree audits are unofficial records of academic progress. Students are encouraged to consult with their academic advisor about their academic planning.

Course Prerequisites

Course prerequisites are courses that are required to have been completed prior to enrolling in another course. Before registering for a course through the Student Hub, students, regardless of matriculation status, should consult the academic catalog to determine whether they have satisfied the course prerequisites.

Course Corequisites

Course corequisites are courses that are required to be taken concurrently. Before registering for a course through the Student Hub, students, regardless of matriculation status, should read the course description to determine if there is a corequisite requirement and register for both courses.

Retaking a Course

If a student wishes to improve their cumulative grade-point average by retaking a course, they may do so. Only the grade earned in the last attempt is used to compute the GPA while all grades remain part of the student's permanent academic record. A student is required to pay the normal tuition charges for all retaken courses. A student may not retake more than two nonrepeatable courses or 8 quarter hours of credit, whichever is greater, to satisfy the requirements of the degree.

Financial aid recipients must be mindful that retaking a course could impact their aid eligibility. Students with questions about this possible impact should contact their financial aid counselor.

Course Waiver

A course waiver may be awarded to a student who has completed the equivalent course at an accredited institution other than the College of Professional Studies in the past five years. The waiver will exempt the student from completing the required course. The student will complete another course, as approved by the program, to satisfy the number of credits required for the program.

Doctoral students must consult with their academic program to determine if course waivers are permitted.

Duration of Courses

Each full fall, winter, and spring term runs for 12 weeks. Each full summer term runs for 8 weeks.

Course durations are as follows:

- During the fall, winter, and spring terms, courses are scheduled for either 6 or 12 weeks.
- During the summer term, courses are scheduled for 4, 6, or 8 weeks.

Course Add/Drop Policy

Refer to the academic calendar (<https://registrar.northeastern.edu/article/academic-calendar/>) for specific dates. Students should consult with their academic advisor before adding or dropping classes.

Students may add a 4-week or 6-week course within the first week of the course. For 8- and 12-week courses, students may add a course within the first 2 weeks of the course. Students who add a class during the add/drop period are responsible for all assignments missed prior to enrolling. Enrolled students are responsible to attend classes during the add/drop period, and absences will be held accountable to the instructor's attendance policy.

Students who drop a course before the add/drop deadline will not be charged for the course and will not have a W (withdrawal) on their transcript. Thereafter, students are responsible for 100% of the tuition charges and applicable fees and the earned grade will be on the students' permanent academic record. All such dates are specified in the academic calendar.

Students must add/drop courses using the Student Hub.

A reduction in a student's course load could affect a student's international student visa status or financial aid eligibility.

Students who experience difficulty adding or dropping a course should promptly request support through the Registrar Service Portal (<https://service.northeastern.edu/registrar/>). If it is determined that there is an issue with the student's Student Hub account or access, they need to contact the Service Desk at 617.373.4357 (HELP); help@northeastern.edu.

Students with holds (e.g., financial, judicial) may have restricted access to add, drop, or withdraw from a course. In such instances, students are responsible for resolving the hold immediately and to meet the established course registration deadlines.

Course Withdrawal Policy

Refer to the academic calendar (<https://registrar.northeastern.edu/article/academic-calendar/>) for specific dates. All students are encouraged to consult with their academic advisor prior to withdrawing from a course.

Students who withdraw from a course after the add/drop deadline and before the last day to withdraw will receive a W grade and will be responsible for 100% of the tuition charges and applicable fees. The W grade does not affect the calculation of the GPA but it does impact a student's academic progression, which may result in the student being placed on academic probation or dismissal.

Students must withdraw from courses using the Student Hub.

A reduction in a student's course load could affect a student's international student visa status or financial aid eligibility.

Students who experience difficulty withdrawing from a course should promptly request support through the Registrar Service Portal (<https://service.northeastern.edu/registrar/>). If it is determined that there is an issue with the student's Student Hub account or access, the student needs to contact the Service Desk at 617.373.4357 (HELP); help@northeastern.edu.

Students who fail to withdraw from a course by the deadline, regardless of their level of class participation or attendance, are financially and academically responsible. A student's lack of participation/attendance will likely result in a final grade of F.

Withdrawals may impact a student's time to degree completion.

Reinstatement after Academic Dismissal

A student who is academically dismissed from the College of Professional Studies is not eligible to register again for courses at CPS until they are approved for reinstatement. A student may apply for reinstatement after a minimum of one academic term if they can provide documented evidence supporting the application (e.g., completed two graduate courses with a grade of B or higher at another accredited college or relevant professional development opportunities during the one-term absence). The application must be made in writing by submitting the appropriate form and providing supporting documentation to the Office of Academic Advising (<https://cps.northeastern.edu/academic-resources/advising/>).

If reinstatement to the college is approved, a student is expected to meet the most current program admissions and curriculum requirements.

A student approved for reinstatement but who does not meet the admissions requirements for the intended program of study, or if the intended program of study is no longer available, may apply to another program.

Students reinstated must achieve good academic standing in the first term of reinstatement.

Seeking More than One Certificate or Degree

A graduate (nondoctoral) student can be enrolled in only one graduate program at a time.

Graduate (nondoctoral) students seeking more than one certificate or degree after having completed a program should note that graduate credits earned toward:

1. A degree at any institution may not be used to satisfy the requirements of another graduate program.
2. A degree earned at the College of Professional Studies may be used to satisfy the requirements of a graduate certificate with a cap of 50% of the required credits of a graduate certificate, if the contents are determined to be applicable per the program director and if the credits were earned within seven years of pursuit of the certificate.
 - a. If the same course is required in the degree and certificate programs and the student has exceeded the maximum number of credits that can be applied in the certificate program, they may request a course substitution to be permitted to take another course instead of repeating the course.
3. With specified exception, a certificate earned at CPS may be used to satisfy the requirements of a graduate degree, if the contents are determined to be applicable per the program director and if the credits were earned within seven years of pursuit of the degree.
4. A certificate earned at CPS may be used to satisfy the requirements of a second certificate with a cap of one course of no more than 4 credits, if the contents are determined to be applicable per the program director and if the credits were earned within seven years of pursuit of the certificate.
 - a. If the same course is required in both certificate programs and the student has exceeded the maximum number of credits that can be applied in the second certificate program, the student will request a course waiver to be permitted to take another course instead of repeating the course. See Course Waiver (p. 991) section.
5. A certificate earned at another accredited institution may be accepted as transfer credits to satisfy the requirements of a graduate degree with a cap of four 3-credit courses or three 4-credit courses (no more than 12 credits), if the contents are determined to be applicable per the program director and if the credits were earned within seven years of pursuit of the degree.

A graduate (nondoctoral) degree student who wishes to pursue a graduate certificate concurrently may seek admission in the certificate program by the end of their first term of matriculation in the degree program. Courses that satisfy requirements for both the degree and certificate will count for each.

- When the certificate is identical to a concentration in a degree program, only the certificate credential will be earned. The student's transcript will not indicate completion of a concentration.

Special Student Status

Graduate applicants to the College of Professional Studies may be eligible to take up to 16 graduate (nondoctoral) quarter hours toward their program while completing the formal application process by seeking special student status (<https://cps.northeastern.edu/admissions-aid/graduate-admissions/graduate-special-student-status/>).

- Students taking courses under special student status are expected to satisfy applicable course prerequisites before enrolling in a course.
- Students taking courses under special student status are not eligible for financial aid.
- Special student status does not guarantee acceptance.
- The maximum number of courses students may take under special student status is two. After completing two courses, students will be blocked from further course registration until they have been officially accepted into a program.

The following programs are not available for special student status: Master of Arts in Teaching; Master of Education, Special Education Concentration; Doctor of Education; Doctor of Law and Policy, or Doctor of Professional Studies.

Special student status is not an option for students on an F-1 visa.

Student Evaluation of Courses

Students play a critical role in Northeastern University's commitment to quality teaching and academic excellence when they participate in the evaluation of courses, an online survey students complete anonymously. Students are expected to participate in the course evaluation process with constructive feedback that is relevant to teaching and course content.

Students may access the course evaluation summary results from previous terms via the Student Hub (<https://me.northeastern.edu/>). Courses with three or fewer students enrolled are not surveyed.

Transfer Credit Policies

All graduate transfer credit awards are made on a case-by-case basis. Transfer credit awards are made for eligible courses successfully completed at regionally and programmatically accredited institutions. The Council for Higher Education Accreditation provides information about the organizations responsible for these two forms of accreditation. Official transcripts from all institutions should be sent directly to the College of Professional Studies Office of Admissions at the time of application.

Students seeking transfer credits earned at institutions outside the United States should submit an official English evaluation completed by an approved credential evaluator. Course descriptions and/or syllabi also should be translated into English and submitted to the College of Professional Studies Office of Admissions.

A maximum of 12 quarter hours or four 3-credit courses or three 4-credit courses obtained at another institution may be accepted as transfer toward the degree, provided the credits consist of work taken at the graduate level for graduate credit, carry minimum grades of B (or 3.000 on a 4.000 scale), have been earned at an accredited institution or equivalent, and have not been used toward any baccalaureate or advanced degree or certificate of advanced graduate study at another institution.

Transfer credits must be no more than five academic years old at the time the student is admitted to graduate study. Courses older than five years will be accepted only in rare circumstances.

Prior Learning Assessment

Students may be eligible for prior learning assessment credit if they have accrued a foundation of knowledge and skills equivalent to the content of courses offered by the College of Professional Studies.

Awarded credits are incorporated into a student's degree plan as transfer credits and are subject to Northeastern University's residency requirement. PLA credit is limited to a maximum of 12 quarter hours for graduate students. Acceptable credits for PLA review are determined from approved certificates, training, and a portfolio review of prior work experience. As part of consideration for PLA credits, faculty will evaluate and map learning outcomes and achievement in alignment with NECHE accreditation requirements.

Potential PLA credits should be considered and discussed as part of a student's transfer credits at the time of enrollment. Interested students should contact their academic advisor for more information.

Graduate Certificate Transfer Credit Policies

- A maximum of 4 quarter hours of transfer credit

Master's Degree Transfer Credit Policies

- A maximum of 12 quarter hours of transfer credit

Doctoral Degree Transfer Credit Policies

- A maximum of 9 quarter hours of transfer credit for Doctor of Education students
- A maximum of 8 quarter hours of transfer credit for Transitional Doctor of Physical Therapy students
- No transfer credit is awarded for students in the Doctor of Law and Policy program

Doctoral Degree Programs

Northeastern University's College of Professional Studies professional doctorate programs are designed for working professionals to address problems of practice through coursework—based on developing professional, scholarly, and research expertise—culminating in an original research project. The programs are guided by industry-leading faculty and are built on the scholar-practitioner model. Students conduct research that is related to their professional experience and designed to solve new and emerging problems.

The Doctor of Education

The Doctor of Education empowers students to bring about solutions to complex problems of practice in their local context, while leveraging a global network to magnify students' boundless experiential learning to build a more socially just world. The Dissertation in Practice, the culminating component of the EdD, is designed to prepare leaders who can construct and apply knowledge to transform their organizations and communities through laboratories of practice where students implement change and then measure and analyze the impact to improve their professional practice. This knowledge is the start of students' potential for meaningful change work. Students magnify their ability to generate socially just change by leveraging Northeastern's global network of students, alumni, employers, and entrepreneurs.

Doctor of Law and Policy

The Doctor of Law and Policy prepares experienced professionals to become transformative leaders who understand and influence the intersection of law, policy, and practice. Our diverse students develop expertise in legal reasoning, policy analysis, and practical implementation while pursuing a thesis tailored to their professional interests and goals. The DLP empowers exceptional citizens to leverage their professional experience with advanced academic training to solve complex problems in organizations, policymaking, and democratic governance. Through rigorous coursework and mentored research, students master advanced analytical methods, develop a nuanced understanding of governance systems, and build expertise in evidence-based decision making within their chosen specialization. The program's distinctive hybrid format accommodates working professionals while fostering a collaborative learning community where intellectual diversity enriches academic discourse. Graduates emerge equipped to drive meaningful change in their organizations, industries, and communities, with the intellectual adaptability to navigate evolving regulatory environments and emerging societal challenges throughout their careers.

Programs

Doctor of Education (EdD)

- Education (Boston) (p. 996)
- Education (Seattle) (p. 999)

Doctor of Law and Policy (DLP)

- Law and Policy (Boston) (p. 1001)
- Law and Policy (Seattle) (p. 1002)

Education, EdD (Boston)

The Doctor of Education (EdD) empowers students to bring about solutions to complex problems of practice in their local context, while leveraging a global network to magnify students' boundless experiential learning to build a more socially just world. The Dissertation in Practice, the culminating component of the degree, is designed to prepare leaders who can construct and apply knowledge to transform their organizations and communities through laboratories of practice where students implement change and then measure and analyze the impact to improve their professional practice. This knowledge is the start of students' potential for meaningful change work. Students magnify their ability to generate socially just change by leveraging Northeastern University's global network of students, alumni, employers, and entrepreneurs.

Admission Requirements

Note that all Doctor of Education degrees offered through the College of Professional Studies have the following admission requirements:

- Online application
- Academic transcripts (undergraduate **and** graduate)
- Admissions statement (1,000–1,200 words)
- Minimum of three years of professional work experience in a related field
- Professional resumé
- Faculty recommendation
- Two professional recommendations
- English-language proficiency proof (for non-native English-language speakers)

HIGHER EDUCATION ADMINISTRATION CONCENTRATION

The Higher Education Administration concentration provides an opportunity for experienced higher education professionals to examine new and deepen previous understanding of practices within all sectors of postsecondary education. Sectors examined include community colleges, four-year colleges, for-profit institutions, and research universities. The increased globalization of higher education is addressed throughout the program. The concentration courses allow experienced higher education professionals to advance their professional practice by developing and deepening their understanding of the roles of colleges and universities in our society. Specifically, this concentration provides the opportunity to:

1. Be well-grounded in areas essential to understanding and articulating the educational roles of colleges and universities that include:
 - Cultural, ethical, and societal issues that affect higher education
 - History of higher education worldwide
 - Organization, governance, leadership, and administrative theories and practices
 - Higher education finance, law, and planning
2. Develop skills and knowledge for establishing and sustaining initiatives in higher education.
3. Address the challenge of ensuring educational equity through an evaluation of the roles, functions, and interrelationships among a college's or university's major constituents, including students, faculty, staff, and alumni.
4. Conduct research at the worksite that contributes to the resolution of an urgent and complex problem of practice.

INNOVATIVE TEACHING AND LEARNING

The Innovative Teaching and Learning concentration focuses on transforming education through innovation, justice, and policy by providing engaging opportunities for current and aspiring teaching and learning specialists working in a variety of educational spaces. In a global, ever-changing educational environment, cultivating strong teaching and learning specialists is critical to building strong, safe, and equitable learning spaces. The concentration focuses on teaching and learning both inside and outside the bounds of P–20 schools. Through a focus on developing and leading innovative curriculum and professional development, the coursework and programmatic experiences are experiential—offers opportunity for learning and growth in connection with partners in the field; modular—develops specialized professional knowledges; and justice-oriented—enables an understanding of change processes that deconstruct systemic injustice at all educational levels. Specifically, the Innovative Teaching and Learning concentration provides the opportunity to:

- Develop the ability to improve teaching and learning through innovation
- Design classroom, curriculum, and professional development that lead to greater achievement and equity

- Design systems to address race, class, and gender inequities in education
- Leverage partnerships with business and community to expand networks and experiences

INTEGRATIVE STUDIES CONCENTRATION

The Integrative Studies Concentration provides an opportunity for students to design a program of study that includes the program-required foundation and research courses, concentration courses from any EdD concentration, and electives from the Doctor of Education or Doctor of Law and Policy programs.

TRANSFORMATIVE SCHOOL LEADERSHIP

The Transformative School Leadership concentration provides innovative opportunities for experienced education professionals who are current and aspiring leaders of early childhood centers, public or private schools, or school districts. In a global, ever-changing educational environment, cultivating strong educational leaders is critical to building strong, safe, and equitable learning spaces. In preparing to meet complex and nuanced educational challenges, school leaders need to be knowledgeable and innovative, capable of facilitating the generation and advancement of new ideas and strategic initiatives, and equipped to shape the needs of education in K–12, higher education, organizational contexts, and beyond. Through deeper engagement with these components, the Transformative School Leadership concentration prepares students to lead and transform educational spaces P–12. The coursework and programmatic experiences are experiential—offers opportunity for learning and growth in connection with partners in the field; modular—develops specialized professional knowledges; and justice-oriented—enables an understanding of change processes that deconstruct systemic injustice at all educational levels. Specifically, this concentration provides the opportunity to:

- Develop the ability to shape a vision of academic success for all students
- Develop leadership capacity in others
- Manage people, data, and processes to develop innovative skills and knowledge
- Design systems to address race, class, and gender inequities in education
- Leverage partnerships with business and community to expand networks and experiences

WORKPLACE LEARNING

The Workplace Learning concentration embraces the value of equity through instruction grounded in the concept of enabling people of all backgrounds, networking across the globe, to achieve their potential and the belief that social issues matter in workplace learning and development. This doctoral concentration in Workplace Learning helps learning professionals gain a deeper understanding of, recognize, and influence real-life social inequalities marginalized populations face in the workplace. The concentration courses allow experienced learning professionals to advance their professional practice by developing and deepening their understanding of workplace learning, organizational dynamics, learning strategy, and ethics. Specifically, this concentration provides the opportunity to:

- Articulate the issues facing workplace learning
- Develop skills and knowledge for establishing and sustaining initiatives and partnerships in workplace learning
- Conduct research in the workplace that contributes to the resolution of an urgent and complex problem of practice

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal CAGS Education Leadership Management (<https://catalog.northeastern.edu/graduate/professional-studies/doctoral-degree-programs/education-leadership-management-cags/#text>). Note that no students will be admitted directly into the CAGS Education Leadership Management (<https://catalog.northeastern.edu/graduate/professional-studies/doctoral-degree-programs/education-leadership-management-cags/#text>) program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Note: A minimum of 51 quarter hours must be taken at the College of Professional Studies.

Required Foundation Courses

Code	Title	Hours
EDU 7207	Foundations of Doctoral Studies	3
EDU 7218	Leadership for Social Justice	3
EDU 7219	Foundations of Collaboration, Leadership, and Change	3

Required Research Courses

Code	Title	Hours
EDU 7225	Fundamentals of Research	3
EDU 7226	Research Design	3
EDU 7294	Advanced Research Design 1	3

EDU 7295	Dissertation in Practice Seminar	3
EDU 7310	Advanced Research Design 2	3

Concentrations

Complete one of the following concentrations:

- Higher Education Administration
- Innovative Teaching and Learning
- Integrative Studies
- Transformative School Leadership (p. 999)
- Workplace Learning (p. 999)

Dissertation in Practice

Code	Title	Hours
EDU 8750	Proposal, Action Step, and Evaluation	6
EDU 8760	Action Research Results and Dissemination	6

Residency Requirement: Each student is required to attend two residency events. Dates and other event information are released annually. Seattle and Charlotte students will satisfy residency requirements through regional campus hybrid coursework.

Elective List

Complete four courses from the EDU 7000 level. Below is a list of courses regularly offered as electives within the Doctor of Education program.

Code	Title	Hours
EDU 7227	The Power of Experiential Learning	
EDU 7228	Bringing Experiential Learning, Assessment, and Reflection to Life	
EDU 7229	The Experiential Learning Leader	
EDU 7230		
EDU 7245		
EDU 7251	Student Engagement in Higher Education	
EDU 7256	Financial Decision Making in Higher Education	
EDU 7260	Comparative International/Global Higher Education	
EDU 7261	International Student Markets	
EDU 7266	Contemporary Issues in Community Colleges	
EDU 7274	Doctoral Seminar in Organizational Leadership and Communication	
EDU 7314		
EDU 7317	Collaboration and Networks in Teaching and Learning	
EDU 7510	Data-Driven Decision Making	
EDU 7511	Digital Workplace Learning	

Doctor of Education Advanced Graduate Credit (<https://cps.northeastern.edu/admissions-aid/graduate-admissions/graduate-transfer-credit/doctor-of-education-advanced-graduate-credit/>)

Program Credit/GPA Requirements

60 total quarter hours required

Minimum 3.000 GPA required

HIGHER EDUCATION ADMINISTRATION

Code	Title	Hours
EDU 7204	Global and Historical Perspectives on Higher Education	3
EDU 7250	Organizational Systems and Institutional Governance	3
EDU 7253	The Legal Environment of Higher Education	3
EDU 7258	Strategic Management in Higher Education	3

INNOVATIVE TEACHING AND LEARNING

Code	Title	Hours
EDU 7217	Educational Systems: The Dynamics of Policy, Power, and Practice	3
EDU 7311	Designing Educational Systems for Justice and Equity	3
EDU 7315	Landscape of Teaching and Learning	3
EDU 7316	Designing Transformative Curriculum and Professional Development	3

INTEGRATIVE STUDIES

Code	Title	Hours
Required Courses		
Complete EDU courses from any other program concentration.		12
Elective Courses		
Complete EDU 7000 courses from the program elective list and any LWP 7000-level course.		12

TRANSFORMATIVE SCHOOL LEADERSHIP

Code	Title	Hours
EDU 7217	Educational Systems: The Dynamics of Policy, Power, and Practice	3
EDU 7311	Designing Educational Systems for Justice and Equity	3
EDU 7312	Landscape of Educational Leadership	3
EDU 7313	Leading and Managing Change	3

WORKPLACE LEARNING

Code	Title	Hours
EDU 7501	Designing Workplace Learning	3
EDU 7502	The Dynamics of Workplace Learning	3
EDU 7503	Leading the Learning Strategy	3
EDU 7504	Diversity, Equity, and Inclusion in Workplace Learning	3

Education, EdD (Seattle)

The Doctor of Education is designed to empower students to bring about solutions to complex problems of practice in their local context, while leveraging a global network to magnify students' boundless experiential learning to build a more socially just world. The Dissertation in Practice, the culminating component of the degree, is designed to prepare leaders who can construct and apply knowledge to transform their organizations and communities through laboratories of practice where students implement change and then measure and analyze the impact to improve their professional practice. This knowledge is the start of students' potential for meaningful change work. Students magnify their ability to generate socially just change by leveraging Northeastern University's global network of students, alumni, employers, and entrepreneurs.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Note: A minimum of 51 quarter hours must be taken at the College of Professional Studies.

Required Foundation Courses

Code	Title	Hours
EDU 7207	Foundations of Doctoral Studies	3
EDU 7218	Leadership for Social Justice	3
EDU 7219	Foundations of Collaboration, Leadership, and Change	3

Required Research Courses

Code	Title	Hours
EDU 7225	Fundamentals of Research	3
EDU 7226	Research Design	3
EDU 7294	Advanced Research Design 1	3
EDU 7295	Dissertation in Practice Seminar	3
EDU 7310	Advanced Research Design 2	3

Dissertation in Practice

Code	Title	Hours
EDU 8750	Proposal, Action Step, and Evaluation	6
EDU 8760	Action Research Results and Dissemination	6

Residency Requirement: Each student is required to attend two residency events. Dates and other event information are released annually. Seattle students will satisfy residency requirements through regional campus hybrid coursework.

Concentrations

Complete one of the following concentrations:

- Higher Education Administration
- Innovative Teaching and Learning
- Integrative Studies
- Transformative School Leadership (p. 1001)
- Workplace Learning (p. 1001)

Elective List

Code	Title	Hours
EDU 7227	The Power of Experiential Learning	
EDU 7228	Bringing Experiential Learning, Assessment, and Reflection to Life	
EDU 7229	The Experiential Learning Leader	
EDU 7251	Student Engagement in Higher Education	
EDU 7256	Financial Decision Making in Higher Education	
EDU 7260	Comparative International/Global Higher Education	
EDU 7261	International Student Markets	
EDU 7266	Contemporary Issues in Community Colleges	
EDU 7274	Doctoral Seminar in Organizational Leadership and Communication	
EDU 7317	Collaboration and Networks in Teaching and Learning	
EDU 7510	Data-Driven Decision Making	
EDU 7511	Digital Workplace Learning	

Doctor of Education Advanced Graduate Credit (<https://cps.northeastern.edu/admissions-aid/graduate-admissions/graduate-transfer-credit/doctor-of-education-advanced-graduate-credit/>)

Program Credit/GPA Requirements

60 total quarter hours required

Minimum 3.000 GPA required

HIGHER EDUCATION ADMINISTRATION CONCENTRATION

Code	Title	Hours
EDU 7204	Global and Historical Perspectives on Higher Education	3
EDU 7250	Organizational Systems and Institutional Governance	3
EDU 7253	The Legal Environment of Higher Education	3
EDU 7258	Strategic Management in Higher Education	3

INNOVATIVE TEACHING AND LEARNING CONCENTRATION

Code	Title	Hours
EDU 7217	Educational Systems: The Dynamics of Policy, Power, and Practice	3
EDU 7311	Designing Educational Systems for Justice and Equity	3
EDU 7315	Landscape of Teaching and Learning	3
EDU 7316	Designing Transformative Curriculum and Professional Development	3

INTEGRATIVE STUDIES CONCENTRATION

Code	Title	Hours
	Complete EDU courses from any other program concentration.	12
	Complete EDU 7000-level courses from the program elective list and any LWP 7000-level course.	12

TRANSFORMATIVE SCHOOL LEADERSHIP CONCENTRATION

Code	Title	Hours
EDU 7217	Educational Systems: The Dynamics of Policy, Power, and Practice	3
EDU 7311	Designing Educational Systems for Justice and Equity	3
EDU 7312	Landscape of Educational Leadership	3
EDU 7313	Leading and Managing Change	3

WORKPLACE LEARNING CONCENTRATION

Code	Title	Hours
EDU 7501	Designing Workplace Learning	3
EDU 7502	The Dynamics of Workplace Learning	3
EDU 7503	Leading the Learning Strategy	3
EDU 7504	Diversity, Equity, and Inclusion in Workplace Learning	3

Law and Policy, DLP (Boston)

Public servants, executives, and managers operate in an increasingly complex global environment. A doctoral education seeks to provide the policy, analytic, and research skills necessary to advance one's career.

Developed jointly by the College of Professional Studies and Northeastern's Public Policy program, the Doctor of Law and Policy program (DLP) is designed for experienced professionals who are interested in the origins, development, implementation, and analysis of legal and public policy decisions in government and related institutions. The program prepares students to advance their careers within a variety of fields while focusing their thesis research on a precise law and policy topic.

Students undertake the DLP in order to understand the ways in which public and related institutions formulate and execute policy. Students have the opportunity to develop the ability to interpret and assess the research of others, to acquire skills as researchers, and to communicate their knowledge to a wide range of audiences. Those who successfully complete the degree are equipped to bring their skills and knowledge to senior policy and management positions in government, nonprofit agencies, research organizations, consulting firms, and corporations.

The DLP program is structured so course work and the doctoral thesis can be completed in two years. Classes meet one weekend per month in Boston, and the learning continues online throughout the rest of the month.

Northeastern University also offers a traditional PhD in Public Policy. To learn more, visit the Public Policy program website (<https://cssh.northeastern.edu/policyschool/program/phd-in-public-policy/>).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LWP 6118	Historical Foundations of American Law	3
LWP 6119	Current Law and Policy Debates: Our Nation's Capital and Beyond	3
LWP 6120	Law and Legal Reasoning 1	3
LWP 6401	Law and Policy Concepts 1	3
LWP 6424	Research Methods	3
LWP 6121	Law and Legal Reasoning 2	3
LWP 6402	Law and Policy Concepts 2: Strategizing for Public Policy	3
LWP 6423	Qualitative Methods	3
LWP 6122	Law and Legal Reasoning 3	3
LWP 6403	Law and Policy Concepts 3: Policy Case Studies	3
LWP 6420	Quantitative Methods	3
LWP 6123	Law and Legal Reasoning 4	3
LWP 6410	Economics for Policy Analysis	3
LWP 6404	Evaluation Research	3

1002 Law and Policy, DLP (Seattle)

LWP 6431	Political and Moral Ethics and Dilemmas	3
LWP 6500	Doctoral Research Design 1	3
LWP 6450	Public Policy Theory and Practice 1	3
LWP 6501	Doctoral Research Design 2	3
LWP 6451	Public Policy Design and Delivery	3
LWP 6502	Doctoral Research Design 3	3
LWP 6452	Public Policy Theory and Practice 3	3
LWP 6503	Doctoral Research Design 4	6

Program Credit/GPA Requirements

69 total quarter hours required

Minimum 3.000 GPA required

Law and Policy, DLP (Seattle)

Public servants, executives, and managers operate in an increasingly complex global environment. A doctoral education seeks to provide the policy, analytic, and research skills necessary to advance one's career.

Developed jointly by the College of Professional Studies and Northeastern's Public Policy program, the Doctor of Law and Policy program (DLP) is designed for experienced professionals who are interested in the origins, development, implementation, and analysis of legal and public policy decisions in government and related institutions. The program prepares students to advance their careers within a variety of fields while focusing their thesis research on a precise law and policy topic.

Students undertake the DLP to understand the ways in which public and related institutions formulate and execute policy. Students have the opportunity to develop the ability to interpret and assess the research of others, to acquire skills as researchers, and to communicate their knowledge to a wide range of audiences. Graduates bring their skills and knowledge to senior policy and management positions in government, nonprofit agencies, research organizations, consulting firms, and corporations.

Northeastern University also offers a traditional PhD in Public Policy. To learn more, visit the Public Policy program website (<https://cssh.northeastern.edu/policyschool/program/phd-in-public-policy/>).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LWP 6118	Historical Foundations of American Law	3
LWP 6119	Current Law and Policy Debates: Our Nation's Capital and Beyond	3
LWP 6120	Law and Legal Reasoning 1	3
LWP 6121	Law and Legal Reasoning 2	3
LWP 6122	Law and Legal Reasoning 3	3
LWP 6123	Law and Legal Reasoning 4	3
LWP 6401	Law and Policy Concepts 1	3
LWP 6402	Law and Policy Concepts 2: Strategizing for Public Policy	3
LWP 6403	Law and Policy Concepts 3: Policy Case Studies	3
LWP 6404	Evaluation Research	3
LWP 6410	Economics for Policy Analysis	3
LWP 6420	Quantitative Methods	3
LWP 6423	Qualitative Methods	3
LWP 6424	Research Methods	3
LWP 6431	Political and Moral Ethics and Dilemmas	3
LWP 6450	Public Policy Theory and Practice 1	3
LWP 6451	Public Policy Design and Delivery	3
LWP 6452	Public Policy Theory and Practice 3	3
LWP 6500	Doctoral Research Design 1	3
LWP 6501	Doctoral Research Design 2	3
LWP 6502	Doctoral Research Design 3	3
LWP 6503	Doctoral Research Design 4	6

Registration in the following course is required if the thesis is not completed by the conclusion of the term of registration for LWP 6503:

LWP 7994

Thesis Continuation—Part Time

0

Program Credit/GPA Requirements

69 total quarter hours required

Minimum 3.000 GPA required

Master's Degree Programs

Our master's degree programs are grounded in theory and applied in practice, representing today's in-demand fields like education, technology, project management, and regulatory affairs. Gain the knowledge and credentials that employers seek with courses designed to accommodate your life. Programs are led by industry professionals and are offered both full- or part-time online, on campus, or in a hybrid format.

Programs

Master of Arts (MA)

- Security and Intelligence Studies (Arlington) (p. 1004)
- Security and Intelligence Studies (Boston) (p. 1007)

Master of Arts in Teaching (MAT)

- Elementary Education (Boston) (p. 1008)
- Secondary Education (Boston) (p. 1010)

Master of Education (MEd)

- Education (Boston) (p. 1012)
- Higher Education Administration (Boston) (p. 1014)

Master of Professional Studies (MPS)

- Analytics (Arlington) (p. 1015)
- Analytics (Boston) (p. 1017)
- Analytics (Oakland) (p. 1019)
- Analytics (Portland) (p. 1021)
- Analytics (Seattle) (p. 1022)
- Analytics (Silicon Valley) (p. 1024)
- Analytics (Toronto) (p. 1026)
- Analytics (Vancouver) (p. 1027)
- Applied Logistics (Boston) (p. 1029)
- Applied Machine Intelligence (Boston) (p. 1031)
- Applied Machine Intelligence (Portland) (p. 1033)
- Digital Media (Boston) (p. 1035)
- Digital Media (Vancouver) (p. 1037)
- Digital Media—Connect (Boston) (p. 1038)
- Digital Media—Connect (Vancouver) (p. 1041)
- Informatics (Boston) (p. 1042)
- Informatics (Toronto) (p. 1044)
- Insurance Analytics and Management (Boston) (p. 1046) - **Admissions to this program have been suspended.**
- Learning Experience Design and Technology (Boston) (p. 1047)

Master of Science (MS)

- Commerce and Economic Development (Boston) (p. 1049)
- Corporate and Organizational Communication (Boston) (p. 1051)
- Global Studies and International Relations (Boston) (p. 1054)
- Human Resources Management (Boston) (p. 1057)
- Nonprofit Management (Boston) (p. 1060)
- Organizational Leadership (Boston) (p. 1064)
- Project Management (Arlington) (p. 1067)
- Project Management (Boston) (p. 1068)

1004 Security and Intelligence Studies, MA (Arlington)

- Project Management (Miami) (p. 1071)
- Project Management (Portland) (p. 1072)
- Project Management (Seattle) (p. 1075)
- Project Management (Silicon Valley) (p. 1077)
- Project Management (Toronto) (p. 1078)
- Regulatory Affairs (Boston) (p. 1081)
- Regulatory Affairs (Toronto) (p. 1083)

Master of Sports Leadership (MSLD)

- Sports Leadership (Boston) (p. 1085)

Security and Intelligence Studies, MA (Arlington)

The Master of Arts in Security and Intelligence Studies aims to prepare professionals working in the security industry, and other related industries, for success as leaders in the field of security in an ever-changing, challenging global environment. This program will serve the mounting need for talent in the security field in both the government and private sectors.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CJS 6125	National Security—Law and Policy	3
HLS 6000	Introduction to Homeland Security	3
HLS 6010	Contemporary Threats to Homeland Security	3
SIA 6040	The Intelligence Community and Interagency Collaboration	3
SIA 6140	Civil Liberties and Security	3
SIA 6980	Capstone	3

Concentration or Electives

The remaining required quarter hours for this program may be completed by a combination of the optional concentration plus elective courses or any courses from the electives list.

- Homeland Security and Emergency Management (p. 1004)
- Strategic Intelligence and Analysis (p. 1004)
- Electives (p. 1005)

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

HOMELAND SECURITY AND EMERGENCY MANAGEMENT CONCENTRATION

Code	Title	Hours
HLS 6040	Critical Infrastructure and Protection	3
HLS 6060	Strategic Planning and Budgeting	3
HLS 6080	Continuity of Operations and Planning	3
HLS 6150	Essentials of Emergency Management	3
HLS 6160	Advanced Emergency Management	3

STRATEGIC INTELLIGENCE AND ANALYSIS CONCENTRATION

Code	Title	Hours
SIA 6010	Intelligence Operations Management	3
SIA 6020	Intelligence in a Globalized World	3
SIA 6030	Intelligence Analysis and Policy Relationship	3
SIA 6050	All-Source Intelligence	4
SIA 6170	Counterintelligence	3

ELECTIVES

Code	Title	Hours
CJS 6030	Organized Crime	
CJS 6105	Domestic and International Terrorism	
CJS 6125	National Security—Law and Policy	
CJS 6430	Risk Management	
GST 6100	Globalization and Global Politics and Economics	
GST 6101	Global Literacy, Culture, and Community	
GST 6102	Global Corporate Social Responsibility	
GST 6109	Basic Field Research Methods	
GST 6200	The Funders	
GST 6210	The Developers	
GST 6220	Globalization of Emerging Economies	
GST 6300	Security and Terrorism	
GST 6310	Immigration and Labor	
GST 6320	Peace and Conflict	
GST 6324	Divided Societies in the Modern World	
GST 6326	International Conflict and Cooperation	
GST 6327	Conflict and Postconflict Development	
GST 6340	The Economics of Development	
GST 6350	Global Economics of Food and Agriculture	
GST 6360	Nuclear Nonproliferation	
GST 6501	Regional Studies: East Asia	
GST 6502	Regional Studies: Middle East and North Africa	
GST 6503	Regional Studies: Sub-Saharan Africa	
GST 6504	Regional Studies: Europe and Eurasia	
GST 6505	Regional Studies: Southwest and Central Asia	
GST 6506	Regional Studies: Latin America	
GST 6540	Politics of the European Union	
GST 6550	U.S. Foreign Policy	
GST 6560	Multilateral Diplomacy	
GST 6580	Opportunities in International Consulting	
GST 6590	Public Diplomacy	
GST 6600	The Practice of Diplomacy	
GST 6610	Sustainable Development	
GST 6700	Global Health Perspectives, Politics, and Experiences in International Development	
GST 6710	Critical Issues and Challenges in the Practice of Global Health	
GST 6740	Human Rights	
GST 6920	Case Study in Global Studies	
GST 7983	Topics	
GST 7990	Thesis	
HLS 6000	Introduction to Homeland Security	
HLS 6010	Contemporary Threats to Homeland Security	
HLS 6020	Technology for Homeland Security	
HLS 6030	Intelligence for Homeland Security	
HLS 6040	Critical Infrastructure and Protection	
HLS 6060	Strategic Planning and Budgeting	
HLS 6070	Emergency Management and Geographic Information Systems	
HLS 6080	Continuity of Operations and Planning	
HLS 6150	Essentials of Emergency Management	
HLS 6155	Critical Infrastructure, Security, and Emergency Management	
HLS 6160	Advanced Emergency Management	
HLS 6983	Topics in Homeland Security	

HLS 7990	Thesis
LDR 6100	Developing Your Leadership Capability
LDR 6101	Leadership Challenge Lab
LDR 6110	Leading Teams Strategically in a Global Environment
LDR 6115	Developing Strategic and Authentic Leadership Communication
LDR 6120	Developing Organizational Success through Leadership Development
LDR 6135	Ethical Leadership
LDR 6140	Leadership Strategy, Design, and Practice
LDR 6145	Developing Sustainable Global Leadership
LDR 6150	Innovation and Organizational Transformation
LDR 6190	Leadership Coaching for Purpose and Performance
LDR 6323	Event Management
LDR 6400	Sports Management
LDR 6405	Sport in Society
LDR 6410	Leadership and Organization in Sport
LDR 6427	Gender and Diversity in Sport
LDR 6430	Sports Law
LDR 6435	Fiscal Practices in Sports
LDR 6440	Sports Marketing and Promotions
LDR 6441	Sports Media Relations
LDR 6442	Athletic Fund-Raising
LDR 6443	Ticket Sales and Strategies
LDR 6445	Corporate Sponsorships
LDR 6455	NCAA Compliance
LDR 6460	Risk Management in Athletics
LDR 6465	Title IX
LDR 6470	Bystander Strategies for the Prevention of Gender-Based Violence
LDR 6480	The Business of eSports
LDR 6615	Academic Advising for Student-Athletes
LDR 6890	The Capstone: Demonstrating Leadership in Action 1
LDR 6895	The Capstone: Demonstrating Leadership in Action 2
LDR 6961	Internship
LDR 6980	Capstone
LDR 6983	Topics
LDR 6995	Project
LDR 7980	The Capstone: Demonstrating Leadership in Action
PJM 5000	Project Management Practices
PJM 5005	Project Scope Management
PJM 5015	Project Risk Management
PJM 5025	Project Scheduling and Cost Planning
PJM 5135	Project Quality Management
PJM 5205	Leading and Managing Technical Projects
PJM 5810	Principles of Agile Project Management
PJM 5900	Foundations of Project Management
PJM 6000	Project Management Practices
PJM 6005	Project Scope Management
PJM 6015	Project Risk Management
PJM 6025	Project Scheduling and Cost Planning
PJM 6075	Project Finance
PJM 6125	Project Evaluation and Assessment
PJM 6135	Project Quality Management
PJM 6140	Managing Troubled Projects
PJM 6145	Global Project Management
PJM 6175	Project Resource Management

PJM 6180	Project Stakeholder Management
PJM 6185	Managing Innovation Projects
PJM 6190	Emerging Research in Project Management
PJM 6205	Leading and Managing Technical Projects
PJM 6210	Communication Skills for Project Managers
PJM 6215	Leading Remote Project Teams
PJM 6610	Foundations of Project Business Analysis
PJM 6620	Strategy Analysis and Needs Assessment
PJM 6630	Requirements Analysis and Design
PJM 6640	Leadership Strategies for the Business Analyst
PJM 6710	Introduction to Program and Portfolio Management
PJM 6810	Principles of Agile Project Management
PJM 6815	Advanced Agile Project Management
PJM 6820	Agile Implementation and Governance
PJM 6825	Agile Lean Product Development
PJM 6910	Capstone
PJM 6983	Special Topics
SIA 6010	Intelligence Operations Management
SIA 6020	Intelligence in a Globalized World
SIA 6030	Intelligence Analysis and Policy Relationship
SIA 6040	The Intelligence Community and Interagency Collaboration
SIA 6050	All-Source Intelligence
SIA 6060	Human Intelligence Operations
SIA 6070	Analysis for Counterterrorism
SIA 6140	Civil Liberties and Security
SIA 6150	Corporate Security and Investigations
SIA 6160	Information Systems Policy
SIA 6170	Counterintelligence
SIA 6980	Capstone
SIA 6983	Topics in Strategic Intelligence and Analysis
SIA 7990	Thesis

Security and Intelligence Studies, MA (Boston)

The Master of Arts in Security and Intelligence Studies aims to prepare professionals working in the security industry, and other related industries, for success as leaders in the field of security in an ever-changing, challenging global environment. This program will serve the mounting need for talent in the security field in both the government and private sectors.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CJS 6125	National Security—Law and Policy	3
HLS 6000	Introduction to Homeland Security	3
HLS 6010	Contemporary Threats to Homeland Security	3
SIA 6040	The Intelligence Community and Interagency Collaboration	3
SIA 6140	Civil Liberties and Security	3
SIA 6980	Capstone	3

Concentrations

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the electives list.

1008 Elementary Education, MAT (Boston)

- Corporate Security Management (p. 1008)
- Homeland Security and Emergency Management (p. 1008)
- Strategic Intelligence and Analysis (p. 1008)

Electives

Code	Title	Hours
Complete courses in the following subjects areas at the 5000 level or above to reach 45 quarter hours: CJS, GST, HLS, LDR, PJM, SIS.		

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

CORPORATE SECURITY MANAGEMENT

Code	Title	Hours
CJS 6430	Risk Management	3
HLS 6080	Continuity of Operations and Planning	3
HLS 6150	Essentials of Emergency Management	3
SIA 6150	Corporate Security and Investigations	3
SIA 6160	Information Systems Policy	3

HOMELAND SECURITY AND EMERGENCY MANAGEMENT

Code	Title	Hours
HLS 6040	Critical Infrastructure and Protection	3
HLS 6060	Strategic Planning and Budgeting	3
HLS 6080	Continuity of Operations and Planning	3
HLS 6150	Essentials of Emergency Management	3
HLS 6160	Advanced Emergency Management	3

STRATEGIC INTELLIGENCE AND ANALYSIS

Code	Title	Hours
SIA 6010	Intelligence Operations Management	3
SIA 6020	Intelligence in a Globalized World	3
SIA 6030	Intelligence Analysis and Policy Relationship	3
SIA 6050	All-Source Intelligence	4
SIA 6170	Counterintelligence	3

Elementary Education, MAT (Boston)

Designed for Massachusetts-based aspiring teachers and career changers, the Master of Arts in Teaching in Elementary Education (MAT)¹ offers an appreciation for and an understanding of the diverse educational needs, social concerns, and cultural values of today's elementary and secondary schools. This graduate degree in teaching seeks to enhance your foundational skills, broaden your perspectives, and strengthen your ability to inspire and educate. The master's degree, which includes a full term of student teaching and prepracticum experiential fieldwork, seeks to produce graduates well positioned to make a meaningful impact in their school, in their community, and in the lives of their students.

The Elementary MAT+ provides qualifying students with the opportunity to complete a Master of Arts in Teaching (MAT) with further study in a selected area of expertise. Currently, students can take additional coursework to earn either endorsement for an additional license in special education (Teacher of Students of Moderate Disabilities, PreK–8) or endorsement for an additional license in ESL (Teacher of English as a Second Language, Pre-K–6) to the Massachusetts Department of Elementary and Secondary Education. Teacher candidates may also plan a program of study that allows for triple licensure in consultation with the program director.

A formal application for approval or placement of field-based experiences for prepracticum and practicum requirements must be filed with the Office of Licensure and Field Experience before a student may enroll in a course requiring fieldwork. Deadline for fall placements and approvals must be completed by April 1st (of the previous spring quarter), October 1st for winter placements and approvals, and February 1st for spring placements and approvals.

- ¹ The MAT Elementary (grades 1–6) has been approved at the initial licensure level by the Massachusetts Department of Elementary and Secondary Education.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
EDU 6051	Introduction to Social Justice in Educational Settings	4
EDU 6086	Foundations of Literacy Development and Instruction	4
EDU 6101	Critical Issues in Education: Past and Present	2
EDU 6102	Reflection, Community Engagement, and Agency in Education	2
EDU 6104	Child and Adolescent Development, Learning, and Teaching	4
EDU 6107	Inclusion, Equity, and Diversity ¹	4
EDU 6154	Inquiry in the Sciences and Humanities	4
EDU 6155	Inquiry in Mathematics ²	4
EDU 6183	Collaborative Strategies for Effective Classroom Management	3
Complete one of the following:		
<i>For students pursuing emergency elementary teaching licenses or ESL+ licensure in Massachusetts</i>		
EDU 6513	Sheltered English Immersion in the General Classroom	4
<i>For students not pursuing emergency elementary licenses and ESL+ licensure in Massachusetts</i>		
EDU 6185	English-Language Learners in the General Education Classroom	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6866	Teaching Practicum and Seminar	6

- ¹ For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

- ² For students who do not pass their Gateway Performance Task II in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

Program Credit/GPA Requirements

45 total quarter hours required (additional hours may be required for endorsement for Massachusetts licensure)

Minimum 3.000 GPA required

ELEMENTARY MAT+ SPECIAL EDUCATION

The special education course requirements are:

Code	Title	Hours
EDU 6425	Special Education: Role of Special Educators in an Inclusive School ¹	4
EDU 6429	Variations in Child and Adolescent Development	4
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	4
EDU 6569	Differentiated Instruction and Assessment in Mathematics	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

- ¹ For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

MAT+ IN ENGLISH AS A SECOND LANGUAGE (ESL)

This Commonwealth of Massachusetts-approved MAT+ program consists of five courses, some of which may be taken as electives in the MAT program.

The English as a Second Language course requirements are:

Code	Title	Hours
EDU 6300	Introduction to Language and Linguistics	4
EDU 6310	Literacy Development and the Academic Domains ¹	4

EDU 6429	Variations in Child and Adolescent Development	4
EDU 6517	Foundations of Teaching English as a Second Language: Research and Practice ²	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

¹ For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

² For students who do not pass their Gateway Performance Task II in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

Secondary Education, MAT (Boston)

Designed for Massachusetts-based aspiring teachers and career changers, the Master of Arts in Secondary Education (MAT) ¹ offers an appreciation for and an understanding of the diverse educational needs, social concerns, and cultural values of today's secondary schools.

This MAT in Secondary Education seeks to enhance your foundational skills, broaden your perspectives, and strengthen your ability to inspire and educate. This master's degree, which includes a full term of student teaching, seeks to produce graduates well positioned to make a meaningful impact in their school, in their community, and in the lives of their students.

- Gain political, social, and historical perspectives on education
- Explore the richly complex environments of schools and communities
- Develop a working understanding of teaching and learning in diverse settings
- Investigate how humans learn, acquire knowledge, and make sense of their experiences
- Examine theories of teaching and explore how best to teach for understanding and learning achievement
- Research methods and materials, pedagogies, and assessment strategies that foster integrated learning

Options for endorsement to licensure include history, 5–12; biology, 8–12; social science, 5–12; English, 5–12; mathematics, 8–12; chemistry, 8–12; earth and space science, 8–12; political science/political philosophy, 8–12; or physics, 8–12. Determination of program of study to be made by faculty review at time of admission.

The MAT+ offers qualifying students the opportunity to complete a MAT with further study in a selected area of expertise. Currently, students can take additional coursework to earn either endorsement for an additional license in special education (Teacher of Students of Moderate Disabilities, 5–12) or an endorsement for an additional license in ESL (Teacher of English as a Second Language, 5–12) to the Massachusetts Department of Elementary and Secondary Education.

A formal application for approval or placement of field-based experiences for prepracticum and practicum requirements must be filed with the Office of Licensure and Field Placement before a student may enroll in a course requiring fieldwork. Deadline for fall placements and approvals must be completed by April 1 (of the previous spring quarter), October 1 for winter placements and approvals, and February 1 for spring placements and approvals.

¹ The Master of Arts in Teaching Secondary Education (grades 5–12 or 8–12 dependent on content area) has been approved at the initial licensure level by the Massachusetts Department of Elementary and Secondary Education.

² For students who do not pass or complete their Gateway Performance Task I in this course, complete Project (EDU 6995) to meet programmatic and endorsement requirements.

³ For students who do not pass or complete their Gateway Performance Task II in this course, complete Project (EDU 6995) to meet programmatic and endorsement requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
EDU 6051	Introduction to Social Justice in Educational Settings	4
EDU 6064	Curriculum and Assessment	4
EDU 6101	Critical Issues in Education: Past and Present	2
EDU 6102	Reflection, Community Engagement, and Agency in Education	2
EDU 6104	Child and Adolescent Development, Learning, and Teaching	4
EDU 6107	Inclusion, Equity, and Diversity ¹	4
EDU 6162	Language, Culture, and Literacy in Middle and High Schools	4

Complete one of the following:

For students pursuing emergency secondary teaching licenses or ESL+ licensure in Massachusetts

EDU 6513	Sheltered English Immersion in the General Classroom	
<i>For students not pursuing emergency secondary licenses and ESL+ licensure in Massachusetts</i>		
EDU 6185	English-Language Learners in the General Education Classroom	
Complete the following:		
EDU 6183	Collaborative Strategies for Effective Classroom Management	3
EDU 6866	Teaching Practicum and Seminar	6
Complete one of the following:		4
EDU 6122	Teaching the Language Arts ²	
EDU 6124	Teaching History and the Social Sciences ²	
EDU 6127	Teaching Science ²	
EDU 6129	Teaching Mathematics ²	

¹ For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

² For students who do not pass their Gateway Performance Task II in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

Elective Courses

Code	Title	Hours
Complete 4 quarter hours from the following:		4
EDU 6184		
EDU 6300	Introduction to Language and Linguistics	
EDU 6425	Special Education: Role of Special Educators in an Inclusive School	
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	
EDU 6429	Variations in Child and Adolescent Development	
EDU 6438	Teachers as Curriculum Leaders	
EDU 6465		
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	
EDU 6569	Differentiated Instruction and Assessment in Mathematics	

Program Credit/GPA Requirements

45 total quarter hours required (additional hours may be required for endorsement for Massachusetts licensure)

Minimum 3.000 GPA required

LOOKING TO DEEPEN YOUR KNOWLEDGE AND EXPERTISE?

The MAT+ offers qualifying students the opportunity to complete a MAT with further study in a selected area of expertise. Currently, students can take additional coursework to earn either an additional license in special education (Teacher of Students of Moderate Disabilities, pre-K–8 or 5–12) or an additional license in ESL (Teacher of English as a Second Language, pre-K–6 or 5–12).

MAT+ IN SPECIAL EDUCATION

The MAT+ provides qualifying students with the opportunity to complete a Master of Arts in Teaching (MAT) with further study in a selected area of expertise. Currently, students can take additional coursework to earn either an additional license in special education (Teacher of Students of Moderate Disabilities, pre-K–8 or 5–12) or an additional license in ESL (Teacher of English as a Second Language, pre-K–6 or 5–12). Teacher candidates may also plan a program of study that allows for triple licensure in consultation with the program director.

The special education course requirements are:

Code	Title	Hours
EDU 6425	Special Education: Role of Special Educators in an Inclusive School ¹	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	4
EDU 6569	Differentiated Instruction and Assessment in Mathematics	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

- ¹ For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

MAT+ IN ENGLISH AS A SECOND LANGUAGE (ESL)

This Commonwealth of Massachusetts-approved MAT+ program consists of five courses, some of which may be taken as electives in the MAT program.

The English as a Second Language course requirements are:

Code	Title	Hours
EDU 6300	Introduction to Language and Linguistics	4
EDU 6310	Literacy Development and the Academic Domains ¹	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6517	Foundations of Teaching English as a Second Language: Research and Practice ²	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

- ¹ For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

- ² For students who do not pass their Gateway Performance Task II in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

Education, MEd (Boston)

ESL Instruction Concentration

The English as a Second Language Instruction concentration allows teachers with an initial teacher license in Massachusetts to earn an additional license in English as a Second Language (grades PreK–8 or 5–12). The coursework engages graduate students in subject-based knowledge and field experiences. There is a need for more Massachusetts teachers licensed in English as a Second Language, which makes this concentration an essential pathway for teachers to deepen their expertise to meet the broad range of students they work with.

Learning and Instruction Concentration

The learning and instruction concentration in the MEd program is designed for teachers and leaders in K–12-focused schools and community organizations that want to lead change and expand equity in their classrooms, schools, or educational communities. Graduate students examine the impact of local, national, and global changes on educational policy and practice. They deepen their ability to effectively engage diverse students in meaningful learning through coursework focused on curriculum and assessment, teaching and learning, and experiential education.

Students pursuing Massachusetts ESL, preK–12, initial licensure: This program meets Massachusetts Department of Elementary and Secondary Education standards and competencies for licensure as an English as a Second Language Teacher, pre-K–6 and 5–12.

Special Education Concentration

Demand for graduate-level-prepared special education practitioners is on the rise, driven by heightened degree requirements and a shortage of licensed, qualified teachers. In response, the College of Professional Studies is pleased to offer the Master of Education with Concentration in Special Education. Designed for educators who are licensed in Massachusetts at the initial or professional level in another discipline, this innovative master's degree program seeks to prepare you to meet the special needs of students across a variety of school environments.

This program meets Massachusetts Department of Elementary and Secondary Education standards and competencies for licensure as a Teacher of Students with Moderate Disabilities, preK–8 and 5–12.

In this advanced program, you have an opportunity to explore specific topics on modifying curriculum, designing curriculum-based assessments, managing severe behaviors, developing individualized education programs, leveraging community resources, and improving literacy. As a result, you have an opportunity to enhance your ability to meet the needs of a diverse student population and to achieve the competencies required for this specialized license.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
EDU 6050	Education as an Advanced Field of Study	5
EDU 6051	Introduction to Social Justice in Educational Settings	4

Concentration

Complete one of the following concentrations. Students must successfully complete all licensure courses with a grade of B or better in order to progress into their next licensure course.

- ESL Instruction (p. 1013)
- Learning and Instruction
- Special Education

Program Credit/GPA Requirements

45 total quarter hours required (additional hours may be required for endorsement for Massachusetts licensure)

Minimum 3.000 GPA required

CONCENTRATION IN ESL INSTRUCTION

Code	Title	Hours
Required Courses		
EDU 6185 or EDU 6513	English-Language Learners in the General Education Classroom Sheltered English Immersion in the General Classroom	4
EDU 6300	Introduction to Language and Linguistics	4
EDU 6310	Literacy Development and the Academic Domains ¹	4
EDU 6319	How People Learn	4
EDU 6336	Data Literacy for Data-Driven Decision Making	4
EDU 6415	Law, Policy, and the Ecosystem of Education	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6517	Foundations of Teaching English as a Second Language: Research and Practice ²	4
Practicum		
EDU 6874	Practicum, Portfolio, and Panel Review	4

¹ For students who do not pass or complete their Gateway Performance Task I in EDU 6310 Literacy Development and the Academic Domains, complete EDU 6995 Project to meet programmatic and licensure requirements.

² For students who do not pass or complete their Gateway II assessment in EDU 6517 Foundations of Teaching English as a Second Language: Research and Practice, or early fieldwork, complete EDU 6995 Project to meet programmatic and licensure requirements.

³ Required for nonlicensure and licensure programs of study except ESL Massachusetts Licensure Pathway. ESL Massachusetts Licensure Pathway students may substitute EDU 6410 Instructional Leadership with the completion of all ESL Massachusetts Licensure Pathway courses .

CONCENTRATION IN LEARNING AND INSTRUCTION

Code	Title	Hours
Required Courses		
EDU 6319	How People Learn	4
EDU 6336	Data Literacy for Data-Driven Decision Making	4
EDU 6410	Instructional Leadership ⁵	4
EDU 6415	Law, Policy, and the Ecosystem of Education	4
Capstone		
EDU 6225 or EDU 6874	Capstone (to be taken last) ¹ Practicum, Portfolio, and Panel Review	4
Electives		
Complete 16 quarter hours at the EDU 6000 level. Below is a list of elective options:		16
<i>Experiential Teaching and Learning Electives</i>		
EDU 6001	Experiential Learning Theory and Practice	
EDU 6002	Culturally Responsive Experiential Teaching and Learning	
EDU 6003	Applied Research in Experiential Teaching and Learning	
EDU 6004	Leading Experiential Teaching and Learning	
<i>Learning Experience Design Technology Electives</i>		
EDU 6331	E-Learning Design as a Collaborative Profession	
EDU 6332	Open Learning	
EDU 6333	Social Media and Beyond	

Generalist Electives

EDU 6182	Educational Statistics
EDU 6227	The New Supervisor
EDU 6228	Supervising Through Change
EDU 6229	Challenges in Supervision
EDU 6231	Crisis Management
EDU 6329	Connecting Theory and Practice
EDU 6340	Learning Analytics Concepts and Theories
EDU 6558	Issues in Education

ESL Massachusetts Licensure Pathway

EDU 6300	Introduction to Language and Linguistics
EDU 6310	Literacy Development and the Academic Domains ²
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction
EDU 6513 or EDU 6185	Sheltered English Immersion in the General Classroom ⁴ English-Language Learners in the General Education Classroom
EDU 6517	Foundations of Teaching English as a Second Language: Research and Practice ³

¹ Complete EDU 6874 Practicum, Portfolio, and Panel Review instead of EDU 6225 Capstone if pursuing Massachusetts ESL Licensure Pathway courses.

² For students who do not pass or complete their Gateway Performance Task I in EDU 6310 Literacy Development and the Academic Domains, complete EDU 6995 Project to meet programmatic and licensure requirements.

³ For students who do not pass or complete their Gateway II assessment in EDU 6517 Foundations of Teaching English as a Second Language: Research and Practice, or early fieldwork, complete EDU 6995 Project to meet programmatic and licensure requirements.

⁴ EDU 6513: For students pursuing emergency secondary teaching licenses or ESL+ licensure in Massachusetts.

⁵ Required for nonlicensure and licensure programs of study except ESL Massachusetts Licensure Pathway. ESL Massachusetts Licensure Pathway students may substitute EDU 6410 Instructional Leadership with the completion of all ESL Massachusetts Licensure Pathway courses .

CONCENTRATION IN SPECIAL EDUCATION

Code	Title	Hours
Required Courses		
EDU 6425	Special Education: Role of Special Educators in an Inclusive School ¹	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6438	Teachers as Curriculum Leaders	4
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	4
EDU 6569	Differentiated Instruction and Assessment in Mathematics ²	4
EDU 6874	Practicum, Portfolio, and Panel Review	4
Electives		
Complete 12 quarter hours at the EDU 6000 level.		12

¹ For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

² For students who do not pass their Gateway Performance Task II in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

Higher Education Administration, MEd (Boston)

Institutions of higher education around the world are facing considerable pressures that range from changing demographics to financial strain amid disruptions unimaginable 20 years ago. Administrators must develop foundational skills to create conditions that allow their students and institutions to thrive in a constantly changing world. The Master of Education in Higher Education Administration prepares practitioners for the unique and difficult challenges facing the next generation of higher education professionals. This program allows students the flexibility to build upon their skills in a customized manner with a focus on practical skills and course designs firmly grounded in experiential learning.

The Master of Education in Higher Education Administration degree program seeks to prepare student with the knowledge to understand the structure, governance, and operation of various higher education organizations. Within the context of classes, students have an opportunity to develop solutions to real world problems. This innovative master's degree program explores complex industry issues such as student demographics, financial concerns, legal and policy requirements, technology, and competitive forces.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

General Requirements

Code	Title	Hours
EDU 6051	Introduction to Social Justice in Educational Settings	4
EDU 6204	The Foundations of Higher Education	5

Required Courses

Code	Title	Hours
EDU 6205	The Demographics of the New College Student	4
EDU 6217	The History of Colleges and Universities	4
EDU 6218	Money Matters: Financial Management in Higher Education	4
EDU 6219	Higher Education Law and Policy	4
EDU 6234	Program Evaluation, Assessment, and Accreditation in Higher Education	4

Capstone

Code	Title	Hours
EDU 6222	Contemporary Issues Capstone	4

Electives

Code	Title	Hours
Complete 12 quarter hours at the EDU 6000 level or choose from the following courses:		12
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
EDU 6002	Culturally Responsive Experiential Teaching and Learning	
EDU 6202	Faculty, Curriculum, and Academic Community	
EDU 6216	The College Student Experience	
EDU 6224	Strategic Leadership in Enrollment Management	
EDU 6227	The New Supervisor	
EDU 6228	Supervising Through Change	
EDU 6229	Challenges in Supervision	
EDU 6231	Crisis Management	
EDU 6319	How People Learn	
EDU 6329	Connecting Theory and Practice	
LDR 6100	Developing Your Leadership Capability	

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

Analytics, MPS (Arlington)

With the proliferation of data across all sectors of the global economy, there is an immediate need for individuals to be knowledgeable in how to harness this data for continuous analysis and study. This spectrum spans from commercial to nonprofit, from higher education to government, and is constantly expanding with new sectors as data mining becomes the standard for knowledge gathering in the digital age.

The Master of Professional Studies in Analytics helps to meet the demand from employers with a graduate program that provides students with an end-to-end analytics education through a core curriculum with integrated experiential learning opportunities. The program is designed to prepare students with a deep understanding of the mechanics of working with data (i.e., its collection, modeling, and structuring), along with the capacity to identify and communicate data-driven insights that ultimately influence decisions.

Not only will students graduate with a portfolio of work samples that demonstrate their range and depth of skill, they will be part of a larger network of analytics professionals who will serve them now and in the future.

- Build portfolios of real-world projects demonstrating competency with key technologies, visualization and communication techniques, and the ability to translate information into recommended actions.
- Gain a core analytical skill set upon which to layer more specialized technical skill sets or industry-specific applications.

- Develop a relationship to industry leaders and peers so that you may leverage your Northeastern education long after your formal education ends.
- Choose from a host of flexible programming options—all of which share an industry-defined core curriculum and a required, credit-bearing experiential requirement.
- Anticipate and contribute to the future direction of data analytics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
Note: ITC 6000 is for students without prior educational or professional experience with data and database structures. Students who do not complete ITC 6000 must complete additional elective coursework to meet the program's required 45 quarter hours.		
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6050	Introduction to Enterprise Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
ITC 6000	Database Management Systems	3

Experiential Learning Course

Code	Title	Hours
ALY 6080	Integrated Experiential Learning	3

Experiential Capstone Course

Code	Title	Hours
ALY 6980	Capstone	3

The remaining quarter hours of the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and electives (p. 1017) list.

Concentrations

- Applied Machine Intelligence (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Applied%20Machine%20Intelligence>)
- Statistical Modeling (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Statistical%20Modeling>)

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

APPLIED MACHINE INTELLIGENCE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3

STATISTICAL MODELING

Code	Title	Hours
ALY 6020	Predictive Analytics	3
ALY 6030	Data Warehousing and SQL	3
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
ALY 6140	Python and Analytics Systems Technology	3

Electives

Code	Title	Hours
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	
ALY 6120	Leadership in Analytics	
ALY 6130	Risk Management for Analytics	
ALY 6140	Python and Analytics Systems Technology	
ALY 6150	Healthcare/Pharmaceutical Data and Applications	
ALY 6983	Topics	
CED 6230	Quantitative Methods	
CMN 6005	Foundations of Professional Communication	
EAI 6000	Fundamentals of Artificial Intelligence	
EAI 6010	Applications of Artificial Intelligence	
EAI 6020	AI System Technologies	
EAI 6400	Data Governance and Responsible AI	
GIS 5201	Advanced Spatial Analysis	
ITC 6020	Information Systems Design and Development	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6135	Ethical Leadership	
PJM 6015	Project Risk Management	
PJM 6125	Project Evaluation and Assessment	
PJM 6180	Project Stakeholder Management	

Analytics, MPS (Boston)

With the proliferation of data across all sectors of the global economy, there is an immediate need for individuals to be knowledgeable in how to harness this data for continuous analysis and study. This spectrum spans from commercial to nonprofit, from higher education to government, and is constantly expanding with new sectors as data mining becomes the standard for knowledge gathering in the digital age.

The Master of Professional Studies in Analytics helps to meet the demand from employers with a graduate program that provides students with an end-to-end analytics education through a core curriculum with integrated experiential learning opportunities. The program is designed to prepare students with a deep understanding of the mechanics of working with data (i.e., its collection, modeling, and structuring), along with the capacity to identify and communicate data-driven insights that ultimately influence decisions.

Not only will students graduate with a portfolio of work samples that demonstrate their range and depth of skill, they will be part of a larger network of analytics professionals who will serve them now and in the future.

- Build portfolios of real-world projects demonstrating competency with key technologies, visualization and communication techniques, and the ability to translate information into recommended actions.
- Gain a core analytical skill set upon which to layer more specialized technical skill sets or industry-specific applications.
- Develop a relationship to industry leaders and peers so that you may leverage your Northeastern education long after your formal education ends.
- Choose from a host of flexible programming options—all of which share an industry-defined core curriculum and a required, credit-bearing experiential requirement.
- Anticipate and contribute to the future direction of data analytics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
Note: ITC 6000 is for students without prior educational or professional experience with data and database structures. Students who do not complete ITC 6000 must complete a third elective course to reach 45 quarter hours.		
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3

1018 Analytics, MPS (Boston)

ALY 6015	Intermediate Analytics	3
ALY 6050	Introduction to Enterprise Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
ITC 6000	Database Management Systems	3

Experiential Learning Course

Code	Title	Hours
ALY 6080	Integrated Experiential Learning	3

Experiential Capstone Course

Code	Title	Hours
ALY 6980	Capstone	3

The remaining quarter hours of the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective list.

Concentrations

- Applied Machine Intelligence (p. 1019)
- Evidence-Based Management (p. 1019)
- Statistical Modeling (p. 1019)

Electives

Code	Title	Hours
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	
ALY 6120	Leadership in Analytics	
ALY 6130	Risk Management for Analytics	
ALY 6140	Python and Analytics Systems Technology	
ALY 6150	Healthcare/Pharmaceutical Data and Applications	
ALY 6160		
ALY 6983	Topics	
CED 6230	Quantitative Methods	
CMN 6005	Foundations of Professional Communication	
COP 6940		
EAI 6000	Fundamentals of Artificial Intelligence	
EAI 6010	Applications of Artificial Intelligence	
EAI 6020	AI System Technologies	
EAI 6400	Data Governance and Responsible AI	
EDU 6184		
GIS 5201	Advanced Spatial Analysis	
ITC 6020	Information Systems Design and Development	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
ITC 6310		
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6135	Ethical Leadership	
PJM 6015	Project Risk Management	
PJM 6125	Project Evaluation and Assessment	
PJM 6180	Project Stakeholder Management	

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

APPLIED MACHINE INTELLIGENCE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3

EVIDENCE-BASED MANAGEMENT

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6060	Decision Support and Business Intelligence	3
ALY 6120	Leadership in Analytics	3
ALY 6130	Risk Management for Analytics	3
PJM 6005	Project Scope Management	3

STATISTICAL MODELING

Code	Title	Hours
ALY 6020	Predictive Analytics	3
ALY 6030	Data Warehousing and SQL	3
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
ALY 6140	Python and Analytics Systems Technology	3

Analytics, MPS (Oakland)

With the proliferation of data across all sectors of the global economy, there is an immediate need for individuals to be knowledgeable in how to harness this data for continuous analysis and study. This spectrum spans from commercial to nonprofit, from higher education to government, and is constantly expanding with new sectors as data mining becomes the standard for knowledge gathering in the digital age.

The Master of Professional Studies in Analytics helps to meet the demand from employers with a graduate program that provides students with an end-to-end analytics education through a core curriculum with integrated experiential learning opportunities. The program is designed to prepare students with a deep understanding of the mechanics of working with data (i.e., its collection, modeling, and structuring), along with the capacity to identify and communicate data-driven insights that ultimately influence decisions.

Not only will students graduate with a portfolio of work samples that demonstrate their range and depth of skill, they will be part of a larger network of analytics professionals who will serve them now and in the future.

- Build portfolios of real-world projects demonstrating competency with key technologies, visualization and communication techniques, and the ability to translate information into recommended actions.
- Gain a core analytical skill set upon which to layer more specialized technical skill sets or industry-specific applications.
- Develop a relationship to industry leaders and peers so that you may leverage your Northeastern education long after your formal education ends.
- Choose from a host of flexible programming options—all of which share an industry-defined core curriculum and a required, credit-bearing experiential requirement.
- Anticipate and contribute to the future direction of data analytics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6050	Introduction to Enterprise Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
ITC 6000	Database Management Systems	3

Experiential Learning Course

Code	Title	Hours
ALY 6080	Integrated Experiential Learning	3

Experiential Capstone Course

Code	Title	Hours
ALY 6980	Capstone	3

The remaining quarter hours of the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective (p. 1020) list.

Concentrations

- Applied Machine Intelligence (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Applied%20Machine%20Intelligence>)
- Statistical Modeling (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Statistical%20Modeling>)

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

APPLIED MACHINE INTELLIGENCE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3

STATISTICAL MODELING

Code	Title	Hours
ALY 6020	Predictive Analytics	3
ALY 6030	Data Warehousing and SQL	3
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
ALY 6140	Python and Analytics Systems Technology	3

Electives

Code	Title	Hours
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6050	Introduction to Enterprise Analytics	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	
ALY 6120	Leadership in Analytics	
ALY 6130	Risk Management for Analytics	
ALY 6140	Python and Analytics Systems Technology	
ALY 6983	Topics	
EAI 6000	Fundamentals of Artificial Intelligence	
EAI 6010	Applications of Artificial Intelligence	
EAI 6020	AI System Technologies	
ITC 6000	Database Management Systems	
ITC 6020	Information Systems Design and Development	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
PJM 5900	Foundations of Project Management	

PJM 6000	Project Management Practices
PJM 6005	Project Scope Management

Analytics, MPS (Portland)

With the proliferation of data across all sectors of the global economy, there is an immediate need for individuals to be knowledgeable in how to harness this data for continuous analysis and study. This spectrum spans from commercial to nonprofit, from higher education to government, and is constantly expanding with new sectors as data mining becomes the standard for knowledge gathering in the digital age.

The Master of Professional Studies in Analytics helps to meet the demand from employers with a graduate program that provides students with an end-to-end analytics education through a core curriculum with integrated experiential learning opportunities. The program is designed to prepare students with a deep understanding of the mechanics of working with data (i.e., its collection, modeling, and structuring), along with the capacity to identify and communicate data-driven insights that ultimately influence decisions.

Not only will students graduate with a portfolio of work samples that demonstrate their range and depth of skill, they will be part of a larger network of analytics professionals who will serve them now and in the future.

- Build portfolios of real-world projects demonstrating competency with key technologies, visualization and communication techniques, and the ability to translate information into recommended actions.
- Gain a core analytical skill set upon which to layer more specialized technical skill sets or industry-specific applications.
- Develop a relationship to industry leaders and peers so that you may leverage your Northeastern education long after your formal education ends.
- Choose from a host of flexible programming options—all of which share an industry-defined core curriculum and a required, credit-bearing experiential requirement.
- Anticipate and contribute to the future direction of data analytics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6050	Introduction to Enterprise Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
ITC 6000	Database Management Systems	3

Experiential Learning Course

Code	Title	Hours
ALY 6080	Integrated Experiential Learning	3

The remaining quarter hours of the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective (p. 1022) list.

Concentrations

- Applied Machine Intelligence (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Applied%20Machine%20Intelligence>)
- Evidence-Based Management (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Evidence-Based%20Management>)
- Statistical Modeling (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Statistical%20Modeling>)

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

APPLIED MACHINE INTELLIGENCE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3

EVIDENCE-BASED MANAGEMENT

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6060	Decision Support and Business Intelligence	3
ALY 6120	Leadership in Analytics	3
ALY 6130	Risk Management for Analytics	3
PJM 6005	Project Scope Management	3

STATISTICAL MODELING

Code	Title	Hours
ALY 6020	Predictive Analytics	3
ALY 6030	Data Warehousing and SQL	3
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
ALY 6140	Python and Analytics Systems Technology	3

Electives

Code	Title	Hours
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	
ALY 6120	Leadership in Analytics	
ALY 6130	Risk Management for Analytics	
ALY 6140	Python and Analytics Systems Technology	
ALY 6150	Healthcare/Pharmaceutical Data and Applications	
ALY 6983	Topics	
CED 6230	Quantitative Methods	
CMN 6005	Foundations of Professional Communication	
EAI 6000	Fundamentals of Artificial Intelligence	
EAI 6010	Applications of Artificial Intelligence	
EAI 6020	AI System Technologies	
EAI 6400	Data Governance and Responsible AI	
ITC 6020	Information Systems Design and Development	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6135	Ethical Leadership	
PJM 6015	Project Risk Management	
PJM 6125	Project Evaluation and Assessment	
PJM 6180	Project Stakeholder Management	

Analytics, MPS (Seattle)

With the proliferation of data across all sectors of the global economy, there is an immediate need for individuals to be knowledgeable in how to harness this data for continuous analysis and study. This spectrum spans from commercial to nonprofit, from higher education to government, and is constantly expanding with new sectors as data mining becomes the standard for knowledge gathering in the digital age.

The Master of Professional Studies in Analytics helps to meet the demand from employers with a graduate program that provides students with an end-to-end analytics education through a core curriculum with integrated experiential learning opportunities. The program is designed to prepare students with a deep understanding of the mechanics of working with data (i.e., its collection, modeling, and structuring), along with the capacity to identify and communicate data-driven insights that ultimately influence decisions.

Not only will students graduate with a portfolio of work samples that demonstrate their range and depth of skill, they will be part of a larger network of analytics professionals who will serve them now and in the future.

- Build portfolios of real-world projects demonstrating competency with key technologies, visualization and communication techniques, and the ability to translate information into recommended actions.
- Gain a core analytical skill set upon which to layer more specialized technical skill sets or industry-specific applications.
- Develop a relationship to industry leaders and peers so that you may leverage your Northeastern education long after your formal education ends.
- Choose from a host of flexible programming options—all of which share an industry-defined core curriculum and a required, credit-bearing experiential requirement.
- Anticipate and contribute to the future direction of data analytics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6050	Introduction to Enterprise Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3

Experiential Learning Course

Code	Title	Hours
ALY 6080	Integrated Experiential Learning	3

Experiential Capstone Course

Code	Title	Hours
ALY 6980	Capstone	3

The remaining quarter hours of the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and electives (p. 1024) list.

Concentrations

- Applied Machine Intelligence (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Applied%20Machine%20Intelligence>)
- Statistical Modeling (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Statistical%20Modeling>)

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

APPLIED MACHINE INTELLIGENCE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3

STATISTICAL MODELING

Code	Title	Hours
ALY 6020	Predictive Analytics	3
ALY 6030	Data Warehousing and SQL	3
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
ALY 6140	Python and Analytics Systems Technology	3

Electives

Code	Title	Hours
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	
ALY 6120	Leadership in Analytics	
ALY 6130	Risk Management for Analytics	
ALY 6140	Python and Analytics Systems Technology	
ALY 6150	Healthcare/Pharmaceutical Data and Applications	
ALY 6983	Topics	
CED 6230	Quantitative Methods	
CMN 6005	Foundations of Professional Communication	
EAI 6000	Fundamentals of Artificial Intelligence	
EAI 6010	Applications of Artificial Intelligence	
EAI 6020	AI System Technologies	
EAI 6400	Data Governance and Responsible AI	
GIS 5201	Advanced Spatial Analysis	
ITC 6020	Information Systems Design and Development	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6135	Ethical Leadership	
PJM 6015	Project Risk Management	
PJM 6125	Project Evaluation and Assessment	
PJM 6180	Project Stakeholder Management	

Analytics, MPS (Silicon Valley)

With the proliferation of data across all sectors of the global economy, there is an immediate need for individuals to be knowledgeable in how to harness this data for continuous analysis and study. This spectrum spans from commercial to nonprofit, from higher education to government, and is constantly expanding with new sectors as data mining becomes the standard for knowledge gathering in the digital age.

The Master of Professional Studies in Analytics helps to meet the demand from employers with a graduate program that provides students with an end-to-end analytics education through a core curriculum with integrated experiential learning opportunities. The program is designed to prepare students with a deep understanding of the mechanics of working with data (i.e., its collection, modeling, and structuring), along with the capacity to identify and communicate data-driven insights that ultimately influence decisions.

Not only will students graduate with a portfolio of work samples that demonstrate their range and depth of skill, they will be part of a larger network of analytics professionals who will serve them now and in the future.

- Build portfolios of real-world projects demonstrating competency with key technologies, visualization and communication techniques, and the ability to translate information into recommended actions.
- Gain a core analytical skill set upon which to layer more specialized technical skill sets or industry-specific applications.
- Develop a relationship to industry leaders and peers so that you may leverage your Northeastern education long after your formal education ends.
- Choose from a host of flexible programming options—all of which share an industry-defined core curriculum and a required, credit-bearing experiential requirement.
- Anticipate and contribute to the future direction of data analytics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6050	Introduction to Enterprise Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
ITC 6000	Database Management Systems	3

Experiential Learning Course

Code	Title	Hours
ALY 6080	Integrated Experiential Learning	3

Experiential Capstone Course

Code	Title	Hours
ALY 6980	Capstone	3

The remaining quarter hours of the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective (p. 1025) list.

Concentrations

- Applied Machine Intelligence (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Applied%20Machine%20Intelligence>)
- Statistical Modeling (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Statistical%20Modeling>)

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

APPLIED MACHINE INTELLIGENCE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3

STATISTICAL MODELING

Code	Title	Hours
ALY 6020	Predictive Analytics	3
ALY 6030	Data Warehousing and SQL	3
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
ALY 6140	Python and Analytics Systems Technology	3

Electives

Code	Title	Hours
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6050	Introduction to Enterprise Analytics	
ALY 6060	Decision Support and Business Intelligence	

ALY 6110	Data Management and Big Data
ALY 6120	Leadership in Analytics
ALY 6130	Risk Management for Analytics
ALY 6140	Python and Analytics Systems Technology
ALY 6983	Topics
EAI 6000	Fundamentals of Artificial Intelligence
EAI 6010	Applications of Artificial Intelligence
EAI 6020	AI System Technologies
ITC 6000	Database Management Systems
ITC 6020	Information Systems Design and Development
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility
PJM 5900	Foundations of Project Management
PJM 6000	Project Management Practices
PJM 6005	Project Scope Management

Analytics, MPS (Toronto)

With the proliferation of data across all sectors of the global economy, there is an immediate need for individuals to be knowledgeable in how to harness this data for continuous analysis and study. This spectrum spans from commercial to nonprofit, from higher education to government, and is constantly expanding with new sectors as data mining becomes the standard for knowledge gathering in the digital age.

The Master of Professional Studies in Analytics helps to meet the demand from employers with a graduate program that provides students with an end-to-end analytics education through a core curriculum with integrated experiential learning opportunities. The program is designed to prepare students with a deep understanding of the mechanics of working with data (i.e., its collection, modeling, and structuring), along with the capacity to identify and communicate data-driven insights that ultimately influence decisions.

Not only will students graduate with a portfolio of work samples that demonstrate their range and depth of skill, they will be part of a larger network of analytics professionals who will serve them now and in the future.

- Build portfolios of real-world projects demonstrating competency with key technologies, visualization and communication techniques, and the ability to translate information into recommended actions.
- Gain a core analytical skill set upon which to layer more specialized technical skill sets or industry-specific applications.
- Develop a relationship to industry leaders and peers so that you may leverage your Northeastern education long after your formal education ends.
- Choose from a host of flexible programming options—all of which share an industry-defined core curriculum and a required, credit-bearing experiential requirement.
- Anticipate and contribute to the future direction of data analytics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6050	Introduction to Enterprise Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3

Experiential Learning Course

Code	Title	Hours
ALY 6080	Integrated Experiential Learning	3

Experiential Capstone Course

Code	Title	Hours
ALY 6980	Capstone	3

The remaining quarter hours of the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective (p. 1027) list.

Concentrations

- Applied Machine Intelligence (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Applied%20Machine%20Intelligence>)
- Evidence-Based Management (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Evidence-Based%20Management>)
- Statistical Modeling (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Statistical%20Modeling>)

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

APPLIED MACHINE INTELLIGENCE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3

EVIDENCE-BASED MANAGEMENT

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6060	Decision Support and Business Intelligence	3
ALY 6120	Leadership in Analytics	3
ALY 6130	Risk Management for Analytics	3
PJM 6005	Project Scope Management	3

STATISTICAL MODELING

Code	Title	Hours
ALY 6020	Predictive Analytics	3
ALY 6030	Data Warehousing and SQL	3
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
ALY 6140	Python and Analytics Systems Technology	3

Electives

Code	Title	Hours
ITC 6015	Enterprise Information Architecture	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
LDR 6110	Leading Teams Strategically in a Global Environment	

Analytics, MPS (Vancouver)

With the proliferation of data across all sectors of the global economy, there is an immediate need for individuals to be knowledgeable in how to harness this data for continuous analysis and study. This spectrum spans from commercial to nonprofit, from higher education to government, and is constantly expanding with new sectors as data mining becomes the standard for knowledge gathering in the digital age.

The Master of Professional Studies in Analytics helps to meet the demand from employers with a graduate program that provides students with an end-to-end analytics education through a core curriculum with integrated experiential learning opportunities. The program is designed to prepare students with a deep understanding of the mechanics of working with data (i.e., its collection, modeling, and structuring), along with the capacity to identify and communicate data-driven insights that ultimately influence decisions.

Not only will students graduate with a portfolio of work samples that demonstrate their range and depth of skill, they will be part of a larger network of analytics professionals who will serve them now and in the future.

- Build portfolios of real-world projects demonstrating competency with key technologies, visualization and communication techniques, and the ability to translate information into recommended actions.

- Gain a core analytical skill set upon which to layer more specialized technical skill sets or industry-specific applications.
- Develop a relationship to industry leaders and peers so that you may leverage your Northeastern education long after your formal education ends.
- Choose from a host of flexible programming options—all of which share an industry-defined core curriculum and a required, credit-bearing experiential requirement.
- Anticipate and contribute to the future direction of data analytics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6050	Introduction to Enterprise Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
ITC 6000	Database Management Systems	3

Experiential Learning Course

Code	Title	Hours
ALY 6080	Integrated Experiential Learning	3

Experiential Capstone Course

Code	Title	Hours
ALY 6980	Capstone	3

The remaining quarter hours of the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective (p. 1029) list.

Concentrations

- Applied Machine Intelligence (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Applied%20Machine%20Intelligence>)
- Evidence-Based Management (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Evidence-Based%20Management>)
- Statistical Modeling (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/analytics-mps/#Statistical%20Modeling>)

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

APPLIED MACHINE INTELLIGENCE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3

EVIDENCE-BASED MANAGEMENT

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6060	Decision Support and Business Intelligence	3
ALY 6120	Leadership in Analytics	3
ALY 6130	Risk Management for Analytics	3
PJM 6005	Project Scope Management	3

STATISTICAL MODELING

Code	Title	Hours
ALY 6020	Predictive Analytics	3
ALY 6030	Data Warehousing and SQL	3
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
ALY 6140	Python and Analytics Systems Technology	3

Electives

Code	Title	Hours
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6050	Introduction to Enterprise Analytics	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	
ALY 6120	Leadership in Analytics	
ALY 6130	Risk Management for Analytics	
ALY 6140	Python and Analytics Systems Technology	
ALY 6983	Topics	
EAI 6000	Fundamentals of Artificial Intelligence	
EAI 6010	Applications of Artificial Intelligence	
EAI 6020	AI System Technologies	
ITC 6020	Information Systems Design and Development	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
PJM 5900	Foundations of Project Management	
PJM 6000	Project Management Practices	
PJM 6005	Project Scope Management	

Applied Logistics, MPS (Boston)

The Master of Professional Studies in Applied Logistics is built to prepare students to be agile in the changing warehousing and distribution industry.

As a central pillar of the program, students will study how to handle challenges that arise quickly and develop leadership and project management skills to help communicate to customers, avoid reactionary responses, work collaboratively to find a solution, and to effectively communicate across the supply chain and with customers. By integrating systems thinking with training in the technical applications in logistics, students will gain well-rounded experience that allows them to understand and adapt to strategic imperatives while also being able to execute in detail. The program aims to develop proficiency in descriptive analytics and the use of real-time data to optimize routing among distribution centers and fulfill orders in response to changing customer profiles, shifting product sales, disruptions in the supplier network, and customer demand for packaging changes.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Courses

Code	Title	Hours
APL 6000	Foundations of Applied Logistics Execution	3
APL 6010	Warehouse Management	3
APL 6020	Freight Management	3
APL 6030	ERP Systems for Inventory Management	3

Capstone

Code	Title	Hours
APL 6980	Applied Logistics Capstone	3

The remaining quarter hours may be completed by a combination of completing a concentration and electives or selecting any courses listed in the concentrations and elective lists.

Concentrations

- Analytics (p. 1030)
- Applied Machine Intelligence (p. 1030)
- Leadership (p. 1030)
- Project Management (p. 1031)

Electives

Code	Title	Hours
APL 6050	Supplier Management	
APL 6100	Advanced Technology in Logistics and Distribution	
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6060	Negotiation, Mediation, and Facilitation	
INT 6943	Integrative Experiential Learning	
EAI 6020	AI System Technologies	
LDR 6110	Leading Teams Strategically in a Global Environment	
PJM 5900	Foundations of Project Management	
PJM 6185	Managing Innovation Projects	
PJM 6210	Communication Skills for Project Managers	
SMT 6060	Decision Support and Sales Analytics	

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

Concentrations**ANALYTICS CONCENTRATION**

Code	Title	Hours
Required Courses		
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete one of the following:		3
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

APPLIED MACHINE INTELLIGENCE CONCENTRATION

Code	Title	Hours
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3

LEADERSHIP CONCENTRATION

Code	Title	Hours
Required Courses		
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6150	Innovation and Organizational Transformation	3
Elective		
Complete one of the following:		3

LDR 6135	Ethical Leadership
LDR 6140	Leadership Strategy, Design, and Practice

PROJECT MANAGEMENT CONCENTRATION

Code	Title	Hours
Required Courses		
PJM 5900	Foundations of Project Management ¹	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
Elective		
Complete 3-6 quarter hours from the following:		3-6
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Special Topics	

¹ Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute any project management electives to satisfy the required program hours.

Applied Machine Intelligence, MPS (Boston)

Humankind is on the threshold of a new era—an age of artificial intelligence (AI) as revolutionary in its global impact as the Industrial Revolution. With the proliferation of machine learning and AI across all sectors of the global society, and fields such as financial services, healthcare, and robotics, GEOINT and cybersecurity are already changing as intelligent computers take on once-indispensably human tasks. There is an immediate need for individuals to be knowledgeable in how to manage, analyze, communicate, visualize, and lead in the area of AI by being data, technology, and human literate. The experiential AI curricula includes an introductory core, as well as an advanced core with an end-to-end AI education in the areas of finance, HR, business ventures, and healthcare/pharmaceuticals. The goal is to proactively and thoughtfully prepare students for the evolving technology and the challenges it presents. The curricula framework adopts a multidisciplinary approach to problem solving by combining computer science and analytical skills with functional government and industry expertise, creativity, and leadership with program offerings on-ground and online.

The degree program is distinguished from others by:

- Focusing on the specific but widespread field of AI that exists within a variety of industries and applications
- Northeastern faculty experts, who have extensive and proven experience in computer science, analytics, geospatial science, information technology, etc.
- Courses that focus on providing critical skills in data management, data analysis, data visualization, problem solving, and advanced analytical tools, creating AI-driven decision making in fields like healthcare/pharmaceuticals, finance, HR, and business ventures

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ALY 6110	Data Management and Big Data	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3

EAI 6020	AI System Technologies	3
EAI 6400	Data Governance and Responsible AI	3

Experiential Network and Capstone

Code	Title	Hours
EAI 6980	Integrated Experiential Capstone	3
Choose one of the following:		
ALY 6080	Integrated Experiential Learning	
INT 6940	Experiential Learning Projects for Professionals	

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective list.

Concentrations

- AI for Business Ventures (p. 1032)
- AI for Finance (p. 1032)
- AI for Healthcare (p. 1033)
- AI for Human Resources (p. 1033)

Electives

Code	Title	Hours
ALY 6140	Python and Analytics Systems Technology	
CMN 6000	Introduction to Organizational Communication	
CED 6050	Commerce and Economic Development	
EAI 6080	Advanced Analytical Utilization	
EDU 6184		
GIS 5201	Advanced Spatial Analysis	
GIS 6360	Spatial Databases	
LDR 6135	Ethical Leadership	
PJM 6005	Project Scope Management	
PJM 6015	Project Risk Management	
PJM 6205	Leading and Managing Technical Projects	

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

Concentrations

AI FOR BUSINESS VENTURES

Code	Title	Hours
ALY 6040	Data Mining Applications	3
CED 6230	Quantitative Methods	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3
ITC 6015	Enterprise Information Architecture	3

AI FOR FINANCE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
EAI 6050	Finance Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3
FIN 6101	Accounting Fundamentals for Financial Institutions	3

AI FOR HEALTHCARE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6150	Healthcare/Pharmaceutical Data and Applications	3
EAI 6060	Healthcare Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3

AI FOR HUMAN RESOURCES

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6120	Leadership in Analytics	3
EAI 6070	Human Resources Information Processing	3
EAI 6120	AI Communication and Visualization	3
HRM 6025	Workforce Analytics	3

Applied Machine Intelligence, MPS (Portland)

Humankind is on the threshold of a new era—an age of artificial intelligence (AI) as revolutionary in its global impact as the Industrial Revolution. With the proliferation of machine learning and AI across all sectors of the global society, and fields such as financial services, healthcare, and robotics, GEOINT and cybersecurity are already changing as intelligent computers take on once-indispensably human tasks. There is an immediate need for individuals to be knowledgeable in how to manage, analyze, communicate, visualize, and lead in the area of AI by being data, technology, and human literate. The experiential AI curricula includes an introductory core, as well as an advanced core with an end-to-end AI education in the areas of finance, HR, business ventures, and healthcare/pharmaceuticals. The goal is to proactively and thoughtfully prepare students for the evolving technology and the challenges it presents. The curricula framework adopts a multidisciplinary approach to problem solving by combining computer science and analytical skills with functional government and industry expertise, creativity, and leadership with program offerings on-ground and online.

The degree program is distinguished from others by:

- Focusing on the specific but widespread field of AI that exists within a variety of industries and applications
- Northeastern faculty experts, who have extensive and proven experience in computer science, analytics, geospatial science, information technology, etc.
- Courses that focus on providing critical skills in data management, data analysis, data visualization, problem solving, and advanced analytical tools, creating AI-driven decision making in fields like healthcare/pharmaceuticals, finance, HR, and business ventures

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ALY 6110	Data Management and Big Data	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3
EAI 6400	Data Governance and Responsible AI	3

Experiential Network and Capstone

Code	Title	Hours
EAI 6980	Integrated Experiential Capstone	3
Choose one of the following:		
ALY 6080	Integrated Experiential Learning	
INT 6940	Experiential Learning Projects for Professionals	

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective list.

Concentrations

- AI for Business Ventures (p. 1034)
- AI for Finance (p. 1034)

- AI for Healthcare (p. 1034)
- AI for Human Resources (p. 1034)

Electives

Code	Title	Hours
ALY 6140	Python and Analytics Systems Technology	
CMN 6000	Introduction to Organizational Communication	
EAI 6080	Advanced Analytical Utilization	
GIS 5201	Advanced Spatial Analysis	
GIS 6360	Spatial Databases	
LDR 6135	Ethical Leadership	
PJM 6005	Project Scope Management	
PJM 6015	Project Risk Management	
PJM 6205	Leading and Managing Technical Projects	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

Concentrations

AI FOR BUSINESS VENTURES

Code	Title	Hours
ALY 6040	Data Mining Applications	3
CED 6230	Quantitative Methods	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3
ITC 6015	Enterprise Information Architecture	3

AI FOR FINANCE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
EAI 6050	Finance Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3
FIN 6101	Accounting Fundamentals for Financial Institutions	3

AI FOR HEALTHCARE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6150	Healthcare/Pharmaceutical Data and Applications	3
EAI 6060	Healthcare Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3

AI FOR HUMAN RESOURCES

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6120	Leadership in Analytics	3
EAI 6070	Human Resources Information Processing	3
EAI 6120	AI Communication and Visualization	3
HRM 6025	Workforce Analytics	3

Digital Media, MPS (Boston)

Students in the Master of Professional Studies in Digital Media will build their skills and expertise while gaining experience using a variety of industry-standard and cutting-edge technologies and tools. Our curriculum is organized around three types of experiences: core courses, concentration electives, and a capstone that can be completed as an individual thesis or a team project.

Our core courses in media creation, interactive design, usability, design thinking, and narrative structure provide a baseline for producing content-rich experiences. A series of electives are offered in seven distinctive areas: 3D animation, game design, digital video, social media, digital media management, or one of two tracks in interactive design: visual design or usability and production. In the capstone experience, you'll work with the guidance of faculty to channel your passion into a project that provides tangible evidence of your abilities.

Whether you are a full- or part-time student, our cohort structure allows you to build meaningful working relationships with students from around the globe. Team-based assignments strengthen your project management and leadership skills and allow you to take part in the design and development of more complex media projects than you could by working alone. The team efforts will also prepare you for your future as a professional in digital media's collaboration-oriented culture.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Core Courses

Code	Title	Hours
DGM 6122	Foundations of Digital Storytelling	4
DGM 6145	Information Technology and Creative Practice	4
DGM 6521	Web Creation for Content Management Systems	2
Complete one of the following:		4
DGM 6140	Sound Design	
DGM 6168	Usability and Human Interaction	
Complete one of the following options:		8
Thesis Option		
DGM 6890	Thesis Proposal Development	
DGM 7990	Thesis (at 6 QH)	
Capstone Option		
DGM 7980	Capstone	
Choose one technical course from the workshops list below.		

Concentrations

The remaining quarter hours may be completed by selecting a combination of a concentration and additional electives/workshops or selecting any courses in the concentrations and elective lists. You must complete any prerequisites associated with DGM courses unless granted a waiver under special circumstances.

- 3D Animation (p. 1036)
- Digital Media Management (p.)
- Digital Video (p.)
- Game Design (p.)
- Interactive Design (p.)
- Social Media (p.)

Electives

Code	Title	Hours
Complete one of the following:		3-4
ALY 6110	Data Management and Big Data	
DGM 6125		
DGM 6322	Advanced Digital Storytelling	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
EDU 6184		
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	

Workshops

Optional digital media workshops are designed to provide valuable technical skills and tools for students in all graduate degree programs.

Code	Title	Hours
Students may complete one of the following:		
DGM 6506	Introduction to Digital Video	
DGM 6515	Introduction to After Effects	
DGM 6516	Virtual and Augmented Reality (VR/AR)	
DGM 6892		
TCC 6410		
TCC 6630		

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

3D ANIMATION

Code	Title	Hours
DGM 6450	Animation Basics	4
DGM 6510	3D Modeling	4
DGM 6530	Character Animation	4
DGM 6535	Rigging Principles and Techniques	4
DGM 6540	Compositing	4

DIGITAL MEDIA MANAGEMENT

Code	Title	Hours
DGM 6230	Digital Media Entrepreneurship	4
DGM 6279	Project Management for Digital Media	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4
DGM 6290	Social Media and Brand Strategy Implementation	4

DIGITAL VIDEO

Code	Title	Hours
DGM 6520	Lighting for the Camera	4
DGM 6435	Digital Video Production	4
DGM 6440	Editing in the Digital Studio	4
DGM 6540	Compositing	4
DGM 6545	Documentary and Nonfiction Production	4

GAME DESIGN

Code	Title	Hours
DGM 6308	Intermediate Programming for Digital Media	4
DGM 6400	Game Design Fundamentals	4
DGM 6403	Game Engine Fundamentals	4
DGM 6405	Game Development	4
DGM 6410	Game Design Technology Lab	4

INTERACTIVE DESIGN

Code	Title	Hours
Interactive Design		
DGM 6461	Interactive Information Design 1	4
Complete four courses from one of the following tracks:		16
Design Track		
DGM 6217	Typography for Interactivity	
DGM 6317	Screen-Based Publication Design	

DGM 6463	Interactive Information Design 2
DGM 6471	Designing Infographics
Usability and Development Track	
DGM 6268	Usable Design for Mobile Digital Media
DGM 6308	Intermediate Programming for Digital Media
DGM 6451	Web Development
DGM 6525	Research Methods for Global User Experiences
TCC 6110	
TCC 6710	

SOCIAL MEDIA

Code	Title	Hours
Complete the following:		19-21
Required		
DGM 6285	Interactive Marketing Fundamentals	4
Electives		
Complete 15–17 quarter hours from the following:		
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6075	Digital Marketing Analytics	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6525	Research Methods for Global User Experiences	
DGM 6550	Search Engine Optimization: Strategy and Implementation	

Digital Media, MPS (Vancouver)

Students in the Master of Professional Studies in Digital Media will build their skills and expertise while gaining experience using a variety of industry-standard and cutting-edge technologies and tools. Our curriculum is organized around three types of experiences: core courses, concentration electives, and a capstone that can be completed as an individual thesis or a team project.

Our core courses in media creation, interactive design, usability, design thinking, and narrative structure provide a baseline for producing content-rich experiences. A series of electives are offered in seven distinctive areas: 3D animation, game design, digital video, social media, digital media management, or one of two tracks in interactive design: visual design or usability and production. In the capstone experience, you'll work with the guidance of faculty to channel your passion into a project that provides tangible evidence of your abilities.

Whether you are a full- or part-time student, our cohort structure allows you to build meaningful working relationships with students from around the globe. Team-based assignments are designed to strengthen your project management and leadership skills and allow you to take part in the design and development of more complex media projects than you could by working alone. The team efforts will also prepare you for your future as a professional in digital media's collaboration-oriented culture.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Core Courses

Code	Title	Hours
DGM 6122	Foundations of Digital Storytelling	4
DGM 6145	Information Technology and Creative Practice	4
DGM 6168	Usability and Human Interaction	4
DGM 6521	Web Creation for Content Management Systems	2
Complete one of the following options:		6
Thesis Option		
DGM 6890	Thesis Proposal Development	
DGM 7990	Thesis	
Capstone Option		
DGM 7980	Capstone	

Electives

Code	Title	Hours
Complete one of the following:		3–4
DGM 6322	Advanced Digital Storytelling	
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	

Workshops

Optional digital media workshops are designed to provide valuable technical skills and tools for students in all graduate degree programs. Students may complete one of the following as an optional workshop:

Code	Title	Hours
DGM 6506	Introduction to Digital Video	2
DGM 6515	Introduction to After Effects	2
DGM 6516	Virtual and Augmented Reality (VR/AR)	2

Concentrations

Students on the Vancouver campus may complete a concentration by taking all required courses and specified electives to fulfill their concentration requirements. If a concentration is not chosen, the remaining quarter hours may be completed by a combination of completing a concentration and electives or selecting any courses listed in the concentrations and elective lists.

DIGITAL MEDIA MANAGEMENT

Code	Title	Hours
DGM 6230	Digital Media Entrepreneurship	4
DGM 6279	Project Management for Digital Media	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4
DGM 6290	Social Media and Brand Strategy Implementation	4

SOCIAL MEDIA

Code	Title	Hours
Required Courses		
DGM 6285	Interactive Marketing Fundamentals	4
Complete 15–17 quarter hours from the following:		15–17
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6525	Research Methods for Global User Experiences	
DGM 6550	Search Engine Optimization: Strategy and Implementation	

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

Digital Media, MPS—Connect (Boston)

The Master of Professional Studies in Digital Media Connect program is designed for students without prior experience in core technical and/or creative concepts. This program requires an additional 12 quarter hours of credit, with courses providing intensive, hands-on guidance into the essential knowledge required for the Master of Professional Studies Digital Media curriculum.

For students considering a career change into digital media, this coursework helps you connect your current background to a new digital media track. Courses focus on visual communications, programming foundations, and web creation. Once the fundamental courses are completed, students move into the more advanced Master of Professional Studies in Digital Media course requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundation Courses

Code	Title	Hours
DGM 6105	Visual Communications Foundation	4
DGM 6108	Programming Foundations for Digital Media	4
DGM 6109	Lab for DGM 6108	2
DGM 6501	Web Creation Boot Camp	2

Required Core Courses

Code	Title	Hours
DGM 6122	Foundations of Digital Storytelling	4
DGM 6145	Information Technology and Creative Practice	4
DGM 6521	Web Creation for Content Management Systems	2
Complete one of the following:		4
DGM 6140	Sound Design	
DGM 6168	Usability and Human Interaction	
Complete one of the following options:		8
Thesis Option		
DGM 6890	Thesis Proposal Development	
DGM 7990	Thesis (at 6 QH)	
Capstone Option		
DGM 7980	Capstone	
Complete one technical course from the workshops list below.		

Concentrations

The remaining quarter hours may be completed by selecting a combination of a concentration and additional electives/workshops or selecting any courses in the concentrations and elective lists. You must complete any prerequisites associated with DGM courses unless granted a waiver under special circumstances.

- 3D Animation (p. 1040)
- Digital Media Management (p.)
- Digital Video (p.)
- Game Design (p.)
- Interactive Design (p.)
- Social Media (p.)

Elective

Code	Title	Hours
Complete one of the following:		3-4
ALY 6110	Data Management and Big Data	
DGM 6125		
DGM 6322	Advanced Digital Storytelling	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
EDU 6184		
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	

Workshops

Digital media workshops are designed to provide valuable technical skills and tools for students in all graduate degree programs.

Code	Title	Hours
DGM 6506	Introduction to Digital Video	
DGM 6515	Introduction to After Effects	
DGM 6516	Virtual and Augmented Reality (VR/AR)	
DGM 6892		
TCC 6410		
TCC 6630		

Program Credit/GPA Requirements

56 total quarter hours required

Minimum 3.000 GPA required

3D ANIMATION

Code	Title	Hours
DGM 6450	Animation Basics	4
DGM 6510	3D Modeling	4
DGM 6530	Character Animation	4
DGM 6535	Rigging Principles and Techniques	4
DGM 6540	Compositing	4

DIGITAL MEDIA MANAGEMENT

Code	Title	Hours
DGM 6230	Digital Media Entrepreneurship	4
DGM 6279	Project Management for Digital Media	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4
DGM 6290	Social Media and Brand Strategy Implementation	4

DIGITAL VIDEO

Code	Title	Hours
DGM 6435	Digital Video Production	4
DGM 6440	Editing in the Digital Studio	4
DGM 6520	Lighting for the Camera	4
DGM 6540	Compositing	4
DGM 6545	Documentary and Nonfiction Production	4

GAME DESIGN

Code	Title	Hours
DGM 6308	Intermediate Programming for Digital Media	4
DGM 6400	Game Design Fundamentals	4
DGM 6403	Game Engine Fundamentals	4
DGM 6405	Game Development	4
DGM 6410	Game Design Technology Lab	4

INTERACTIVE DESIGN

Code	Title	Hours
Interactive Design		
DGM 6461	Interactive Information Design 1	4

Complete four courses from one of the following tracks:

16

Design Track

DGM 6217	Typography for Interactivity
DGM 6317	Screen-Based Publication Design
DGM 6463	Interactive Information Design 2
DGM 6471	Designing Infographics

Usability and Development Track

DGM 6268	Usable Design for Mobile Digital Media
DGM 6308	Intermediate Programming for Digital Media
DGM 6451	Web Development
DGM 6525	Research Methods for Global User Experiences
TCC 6110	
TCC 6710	

SOCIAL MEDIA

Code	Title	Hours
Required		
DGM 6285	Interactive Marketing Fundamentals	4
Electives		
Complete 15–17 quarter hours from the following:		
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6075	Digital Marketing Analytics	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6525	Research Methods for Global User Experiences	
DGM 6550	Search Engine Optimization: Strategy and Implementation	

Digital Media, MPS–Connect (Vancouver)

The Master of Professional Studies in Digital Media–Connect program is designed for students without prior experience in core technical and/or creative concepts. This program requires an additional 12 quarter hours of credit, with courses providing intensive, hands-on guidance into the essential knowledge required for the Master of Professional Studies Digital Media curriculum.

For students considering a career change into digital media, this coursework helps you connect your current background to a new digital media track. Courses focus on visual communications, programming foundations, and web creation. Once the fundamental courses are completed, students move into the more advanced Master of Professional Studies in Digital Media course requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundation Courses

Code	Title	Hours
DGM 6105	Visual Communications Foundation	4
DGM 6108 and DGM 6109	Programming Foundations for Digital Media and Lab for DGM 6108	6
DGM 6501	Web Creation Boot Camp	2

Required Core Courses

Code	Title	Hours
DGM 6122	Foundations of Digital Storytelling	4
DGM 6145	Information Technology and Creative Practice	4
DGM 6168	Usability and Human Interaction	4
DGM 6521	Web Creation for Content Management Systems	2
Complete one of the following options:		6
Thesis Option		
DGM 6890	Thesis Proposal Development	
DGM 7990	Thesis	
Capstone Option		
DGM 7980	Capstone	

Electives

Code	Title	Hours
Complete one of the following:		3–4
DGM 6322	Advanced Digital Storytelling	
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	

Workshops

Optional digital media workshops are designed to provide valuable technical skills and tools for students in all graduate degree programs. Students may complete one of the following as an optional workshop:

Code	Title	Hours
DGM 6506	Introduction to Digital Video	2
DGM 6515	Introduction to After Effects	2
DGM 6516	Virtual and Augmented Reality (VR/AR)	2

Concentrations

Students on the Vancouver campus may complete a concentration by taking all required courses and specified electives to fulfill their concentration requirements. If a concentration is not chosen, the remaining quarter hours may be completed by a combination of completing a concentration and electives or selecting any courses listed in the concentrations and elective lists.

DIGITAL MEDIA MANAGEMENT

Code	Title	Hours
DGM 6230	Digital Media Entrepreneurship	4
DGM 6279	Project Management for Digital Media	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4
DGM 6290	Social Media and Brand Strategy Implementation	4

SOCIAL MEDIA

Code	Title	Hours
Required Courses		
DGM 6285	Interactive Marketing Fundamentals	4
Complete 15–17 quarter hours from one of the following:		15–17
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6525	Research Methods for Global User Experiences	
DGM 6550	Search Engine Optimization: Strategy and Implementation	

Program Credit/GPA Requirements

56 total quarter hours required

Minimum 3.000 GPA required

Informatics, MPS (Boston)

A rapidly evolving area, informatics is increasingly used to solve today's problems through IT innovations across many industries, including healthcare, business consulting, education, finance, and social media. This master's degree attracts students and working professionals with a diverse background to learn and improve IT technical and management skills, highlighted by our strengthened curriculum on information security management, as well as cloud computing application and management. Students also have the opportunity to acquire technical training in data analytics, user-centered design and web development, and managing technical projects.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ITC 6000	Database Management Systems	3
ITC 6010	Information Technology Strategy and Governance	3
ITC 6020	Information Systems Design and Development	3
ITC 6035	Information Technology Project Management	3
ITC 6400	Foundations of Informatics	3

Capstone and Experiential Learning

ITC 6040	Informatics Capstone	3
INT 6940	Experiential Learning Projects for Professionals	1-4

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or by selecting any courses listed in the concentrations and electives lists.

Concentrations or Electives

Complete one of the following concentrations or complete the required hours by selecting any courses listed in the concentrations and electives lists:

- Analytics (p. 1043)
- Cloud Computing Application and Management (p. 1043)
- Human-Centered Informatics (p. 1043)
- Information Security Management (p. 1043)
- Leading and Managing Technical Projects (p. 1044)

ANALYTICS CONCENTRATION

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete one of the following:		3
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

CLOUD COMPUTING APPLICATION AND MANAGEMENT CONCENTRATION

Code	Title	Hours
ITC 6015	Enterprise Information Architecture	3
ITC 6420	Introduction to Cloud Computing Applications and Management	3
ITC 6450	Advanced Cloud Computing Applications and Management	3
ITC 6460	Cloud Analytics	3
ITC 6520	Network Protection and Cloud Security	3
Complete one of the following:		3-4
ITC 6355	Web Application Design and Development	
ITC 6470		
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	

HUMAN-CENTERED INFORMATICS CONCENTRATION

Code	Title	Hours
DGM 6168	Usability and Human Interaction	4
DGM 6268	Usable Design for Mobile Digital Media	4
DGM 6461	Interactive Information Design 1	4
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	3
Complete one of the following:		3-4
ALY 6070	Communication and Visualization for Data Analytics	
DGM 6463	Interactive Information Design 2	
ITC 6355	Web Application Design and Development	

INFORMATION SECURITY MANAGEMENT CONCENTRATION

Code	Title	Hours
ITC 6300	Foundations of Information Security	3
ITC 6305	IT Infrastructure (Systems, Networks, Telecom)	3
ITC 6315	Information Security Risk Management	3
ITC 6520	Network Protection and Cloud Security	3
ITC 6530	Security Analytics	3

Complete one of the following:		3
ITC 6330	CISSP Preparation	
ITC 6490	Ethical Hacking	

LEADING AND MANAGING TECHNICAL PROJECTS CONCENTRATION

Code	Title	Hours
PJM 5900	Foundations of Project Management ¹	4
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3

¹ *Note:* Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete Foundations of Project Management (PJM 5900) may substitute an elective from the following list to satisfy the required program hours:

- Project Evaluation and Assessment (PJM 6125)
- Project Quality Management (PJM 6135)
- Managing Troubled Projects (PJM 6140)
- Introduction to Program and Portfolio Management (PJM 6710)

ELECTIVES

Code	Title	Hours
ALY 6015	Intermediate Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6050	Introduction to Enterprise Analytics	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	
ALY 6120	Leadership in Analytics	
ALY 6130	Risk Management for Analytics	
DGM 6501	Web Creation Boot Camp	
DGM 6145	Information Technology and Creative Practice	
DGM 6521	Web Creation for Content Management Systems	
EDU 6184		
GIS 5103	Foundations of Geographic Information Science	
GIS 6340	GIS Customization	
GIS 6360	Spatial Databases	
ITC 6030	Computer Systems and Networks	
ITC 6080		
ITC 6082	Network Protection	
ITC 6345	Systems and Network Administration	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
PJM 5900	Foundations of Project Management	
PJM 6205	Leading and Managing Technical Projects	
TCC 6110		

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

Informatics, MPS (Toronto)

A rapidly evolving area, informatics is increasingly used to solve today's problems through IT innovations across many industries, including healthcare, business consulting, education, finance, and social media. This master's degree attracts students and working professionals with a diverse background to learn and improve IT technical and management skills, highlighted by our strengthened curriculum on information security

management, as well as cloud computing application and management. Students also have the opportunity to acquire technical training in data analytics, user-centered design and web development, and managing technical projects.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ITC 6000	Database Management Systems	3
ITC 6010	Information Technology Strategy and Governance	3
ITC 6020	Information Systems Design and Development	3
ITC 6035	Information Technology Project Management	3
ITC 6400	Foundations of Informatics	3
Capstone and Experiential Learning		
ITC 6040	Informatics Capstone	3
INT 6940	Experiential Learning Projects for Professionals	3

Concentration and Electives

The remaining quarter hours required for this program may be completed by a combination of completing one concentration and any additional courses from any of the concentrations or by selecting any courses listed in the concentrations lists.

- Analytics (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/informatics-mps/#analytics>)
- Cloud Computing Application and Management (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/informatics-mps/#cloud>)
- Information Security Management (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/informatics-mps/#info>)
- Leading and Managing Technical Projects (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/informatics-mps/#tech>)

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

CONCENTRATION IN ANALYTICS

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6020	Predictive Analytics	3
ALY 6040	Data Mining Applications	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete one of the following:		3
ALY 6015	Intermediate Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6110	Data Management and Big Data	

CONCENTRATION IN CLOUD COMPUTING APPLICATION AND MANAGEMENT

Code	Title	Hours
ITC 6015	Enterprise Information Architecture	3
ITC 6420	Introduction to Cloud Computing Applications and Management	3
ITC 6520	Network Protection and Cloud Security	3
ITC 6460	Cloud Analytics	3
ITC 6450	Advanced Cloud Computing Applications and Management	3
Complete one of the following:		3-4
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	
ITC 6355	Web Application Design and Development	

CONCENTRATION IN INFORMATION SECURITY MANAGEMENT

Code	Title	Hours
ITC 6300	Foundations of Information Security	3
ITC 6305	IT Infrastructure (Systems, Networks, Telecom)	3
ITC 6315	Information Security Risk Management	3
ITC 6520	Network Protection and Cloud Security	3
ITC 6530	Security Analytics	3
Complete one of the following:		3
ITC 6330	CISSP Preparation	
ITC 6082	Network Protection	

CONCENTRATION IN LEADING AND MANAGING TECHNICAL PROJECTS

Code	Title	Hours
PJM 6000	Project Management Practices	3
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3
PJM 6825	Agile Lean Product Development	3

Insurance Analytics and Management, MPS (Boston)**Overview**

Admissions to this program have been suspended.

The Master of Professional Studies in Insurance Analytics and Management addresses the mounting need for talent in the insurance industry with focus on disruptive trends and the inherent challenges that this industry sector faces. This program will build on five distinct pillars that are designed to serve the market and to offer graduates a clear pathway into the industry. Those pillars are application orientation, domain knowledge, digital leadership and human-centered design, decision support, and digital transformation. The goal of the MPS program is to produce graduates who are thinkers and designers and developers who merge applications, humanics, data, and technology in the age of digital transformation to benefit their industry.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Courses

Code	Title	Hours
INS 6010	Insurance Finance	3
INS 6020	Claims Management	3
INS 6030	Insurance Underwriting	3
INS 6040	Introduction to Insurance Data Analytics	3
INS 6050	Intermediate Insurance Analytics	3

Experiential Project

Code	Title	Hours
INS 6080	Integrated Experiential Learning	3

Capstone

Code	Title	Hours
INS 6980	Capstone	3

Concentrations

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the electives list.

- Advanced Insurance Management (p. 1047)
- Customer Engagement (p. 1047)
- Decision Support (p. 1047)

Electives

Code	Title	Hours
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	
CED 6230	Quantitative Methods	
CED 6250	Derivatives and Alternative Investments	
EAI 6000	Fundamentals of Artificial Intelligence	
EAI 6020	AI System Technologies	
EAI 6080	Advanced Analytical Utilization	
EAI 6120	AI Communication and Visualization	
GIS 5103	Foundations of Geographic Information Science	
GIS 6370	Internet-Based GIS	
INS 6983	Special Topics	
LDR 6110	Leading Teams Strategically in a Global Environment	
PJM 5900	Foundations of Project Management	
PJM 6210	Communication Skills for Project Managers	

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

ADVANCED INSURANCE MANAGEMENT CONCENTRATION

Code	Title	Hours
ALY 6983	Topics	3
INS 6110	Insurance Regulation and Law	3
INS 6120	Macro Challenges in Insurance	3
INS 6130	Advanced Reinsurance	3
LDR 6135	Ethical Leadership	3

CUSTOMER ENGAGEMENT CONCENTRATION

Code	Title	Hours
ALY 6060	Decision Support and Business Intelligence	3
ALY 6070	Communication and Visualization for Data Analytics	3
INS 6140	Distribution and Sales	3
PJM 6185	Managing Innovation Projects	3
SMT 6020	Managing the Customer Experience	3

DECISION SUPPORT CONCENTRATION

Code	Title	Hours
EAI 6000 is for students who score 85% or more on the Python placement exam upon declaring this concentration. Students who score less than 85% on the placement exam complete a noncredit Python workshop before completing EAI 6000.		
ALY 6060	Decision Support and Business Intelligence	3
ALY 6070	Communication and Visualization for Data Analytics	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6020	AI System Technologies	3
LDR 6100	Developing Your Leadership Capability	3

Learning Experience Design and Technology, MPS (Boston)

The Master of Professional Studies in Learning Experience Design and Technology is a robust practice-based program. It builds expertise in learning designers, educators, trainers, technologists, and other professionals by grounding them in the art and science of learning and the effective use

of learning design principles and technology. It provides both foundational and advanced design-related coursework that is experiential, taught by experts in the field, and incorporates skill-building opportunities that align with contemporary industry-based competencies.

During their course of study, students will have the opportunity to:

- Design learning environments that support learners in meeting academic, personal, professional, and/or organizational goals
- Put creative ideas into action using a variety of technologies and design and delivery modalities
- Develop a robust online portfolio of work to demonstrate their design skills

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundation Courses

Code	Title	Hours
EDU 6050	Education as an Advanced Field of Study	5
EDU 6051	Introduction to Social Justice in Educational Settings	4

Core Courses

Code	Title	Hours
EDU 6319	How People Learn	4
EDU 6323	Digital Learning Tools and Technologies for LXD	4
EDU 6334	Foundations of Learning Experience Design	4
EDU 6335	Advanced Practices in Learning Experience Design	4
EDU 6336	Data Literacy for Data-Driven Decision Making	4

Capstone

Code	Title	Hours
EDU 6225	Capstone	4

Electives

Code	Title	Hours
Electives may be satisfied by any EDU 6000-level course not already being used toward degree requirements. Suggested EDU 6000-level courses are listed below. Additionally, CPS graduate-level courses that may also be used to satisfy elective requirements are listed below:		12

EDU 5978	
EDU 6001	Experiential Learning Theory and Practice
EDU 6002	Culturally Responsive Experiential Teaching and Learning
EDU 6003	Applied Research in Experiential Teaching and Learning
EDU 6004	Leading Experiential Teaching and Learning
EDU 6202	Faculty, Curriculum, and Academic Community
EDU 6323	Digital Learning Tools and Technologies for LXD
EDU 6329	Connecting Theory and Practice
EDU 6331	E-Learning Design as a Collaborative Profession
EDU 6332	Open Learning
EDU 6336	Data Literacy for Data-Driven Decision Making
EDU 6338	Learning Experience Design Studio
EDU 6558	Issues in Education
CMN 6080	Intercultural Communication
DGM 6501	Web Creation Boot Camp
NPM 6140	Grant and Report Writing
PJM 5900	Foundations of Project Management

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

Commerce and Economic Development, MS (Boston)

Globalization has created a borderless economy with a host of new opportunities and challenges for those engaged in commerce and economic development. While global markets offer exciting growth prospects, navigating the world stage requires in-depth knowledge of the financial, regulatory, and economic environments and institutions that affect the global economy and international trade. To meet the need for both insight and skills development, Northeastern University's College of Professional Studies—in collaboration with Northeastern University's College of Social Sciences and Humanities—offers the online Master of Science in Commerce and Economic Development.

This graduate-level program integrates economics, leadership, institutional organization, technology, and public policy into a unique and focused educational experience designed to help guide and advance a rewarding career in the private or public sectors.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CED 6010	Applied Microeconomic Theory 1	3
CED 6020	Applied Macroeconomic Theory 1	3
CED 6030	Mathematical Methods for Economics 1	3
CED 6040	Applied Econometrics 1	3
CED 6050	Commerce and Economic Development	3

Capstone

Code	Title	Hours
The following course should be taken last:		
CED 6910	Capstone: Master's Project	4

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or by selecting any courses listed in the concentration and elective lists.

Concentrations

- Economic Analysis (p. 1049)
- Economic Entrepreneurship (p. 1049)
- Data Analytics (p. 1049)
- Financial Economics (p. 1049)

Electives

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the program:		
ALY 6000	Introduction to Analytics	
ALY 6015	Intermediate Analytics	
ALY 6050	Introduction to Enterprise Analytics	
ALY 6070	Communication and Visualization for Data Analytics	
ALY 6110	Data Management and Big Data	
CED 6011	Applied Microeconomic Theory 2	
CED 6021	Applied Macroeconomic Theory 2	
CED 6031	Mathematical Methods for Economics 2	
CED 6041	Applied Econometrics II	
CED 6051	Open Economy Macroeconomic Analysis	
CED 6070	Economics of Human Capital	
CED 6090	Cultural Economic Development	
CED 6110	Law and Economics	
CED 6120	Environmental Economics	
CED 6130	Sustainable Economic Development	
CED 6140	Economics of E-Commerce	
CED 6210	Managerial Finance	
CED 6220	International Finance	

CED 6230	Quantitative Methods
CED 6240	Financial Ethics
CED 6250	Derivatives and Alternative Investments
CMN 6080	Intercultural Communication
CMN 6095	Foundations of Developing Cultural Awareness
COP 6940	
EDU 6184	
FIN 6102	Asset and Liability Management
FIN 6120	Building Financial Relationships
FIN 6161	Investment Analysis
GST 6102	Global Corporate Social Responsibility
GST 6430	Leadership and Management
LDR 6145	Developing Sustainable Global Leadership

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

ECONOMIC ANALYSIS CONCENTRATION

Code	Title	Hours
CED 6011	Applied Microeconomic Theory 2	3
CED 6021	Applied Macroeconomic Theory 2	3
CED 6031	Mathematical Methods for Economics 2	3
CED 6041	Applied Econometrics II	3
CED 6051	Open Economy Macroeconomic Analysis	3

ECONOMIC ENTREPRENEURSHIP CONCENTRATION

Code	Title	Hours
ALY 6050	Introduction to Enterprise Analytics	3
CED 6070	Economics of Human Capital	3
CED 6140	Economics of E-Commerce	3
CMN 6095	Foundations of Developing Cultural Awareness	3
GST 6430	Leadership and Management	4

DATA ANALYTICS CONCENTRATION

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6015	Intermediate Analytics	3
ALY 6020	Predictive Analytics	3
ALY 6050	Introduction to Enterprise Analytics	3
or ALY 6070	Communication and Visualization for Data Analytics	
ALY 6110	Data Management and Big Data	3

FINANCIAL ECONOMICS CONCENTRATION

Code	Title	Hours
Complete five of the following:		15-18
CED 6210	Managerial Finance	
CED 6220	International Finance	
CED 6230	Quantitative Methods	
CED 6240	Financial Ethics	
CED 6250	Derivatives and Alternative Investments	
FIN 6102	Asset and Liability Management	
FIN 6120	Building Financial Relationships	
FIN 6161	Investment Analysis	

Corporate and Organizational Communication, MS (Boston)

Across all industries and professions, strong written and oral communication skills are essential to success. Whether you are seeking to advance in a communications-related field or get ahead in your current organization, this program seeks to provide the practical knowledge and valuable perspectives you need to communicate across a variety of contexts and situations.

From negotiation and writing to crisis management and public speaking, the Master of Science in Corporate and Organizational Communication degree program examines topics that are critical to effective organizational communication. Incorporating best practices, case studies, and classroom learning, courses within this innovative master's degree in communication address complex communication challenges, seeking to provide you with a distinct advantage in today's competitive marketplace.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab ¹	4
CMN 6010	Strategic Communication Management	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6910	Organizational Communication Assessment	3
Complete two of the following:		6
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6100	Communication Networks and Managing Information	

¹ Introduction to Organizational Communication (CMN 6000) is required for students who do not have any professional experience in communication. Students with professional communication experience begin the program with Strategic Communication Management (CMN 6010) and complete an additional elective to satisfy the required program hours.

Capstone

Code	Title	Hours
CMN 6940	Projects for Professionals	4

Concentration or Electives

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or selecting any courses in the concentrations and elective lists.

CONCENTRATIONS

- Cross-Cultural Communication (p. 1052)
- Human Resource Management (p. 1052)
- Leadership (p. 1053)
- Project Management (p. 1053)
- Public and Media Relations (p. 1053)
- Sales Management (p. 1054)
- Social Media (p. 1054)

ELECTIVE COURSES

Note: Students who take Introduction to Organizational Communication (CMN 6000) are only required to take two courses in this section.

Code	Title	Hours
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6070	Communication and Visualization for Data Analytics	
CMN 6005	Foundations of Professional Communication	
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6050	Crisis Communication	

CMN 6060	Negotiation, Mediation, and Facilitation
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation
CMN 6095	Foundations of Developing Cultural Awareness
CMN 6096	Cultural Communications Lab
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management
COP 6940	
EDU 6184	
INT 6900	International Field Study Experience
LDR 6101	Leadership Challenge Lab
PBR 6001	Communications Technology Lab

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

CROSS-CULTURAL COMMUNICATION

Code	Title	Hours
Required Courses		
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	3
CMN 6095	Foundations of Developing Cultural Awareness	3
Concentration Electives		
Choose from the following:		10
CMN 6096	Cultural Communications Lab	
GST 6100	Globalization and Global Politics and Economics	
GST 6101	Global Literacy, Culture, and Community	
HRM 6070	Global Human Resources Management	
INT 6900	International Field Study Experience	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
LDR 6145	Developing Sustainable Global Leadership	
PBR 6100	Introduction to Public Relations	

HUMAN RESOURCE MANAGEMENT

Code	Title	Hours
Required Courses		
HRM 6015	Introduction to Human Resources Management ²	3
HRM 6025	Workforce Analytics	3
HRM 6042	Strategic Workforce Planning	3
Concentration Electives		
Choose from the following:		7
CMN 6096	Cultural Communications Lab	
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6035	Digital Human Resources Platforms	
HRM 6047	Managing the Employee Life Cycle	
HRM 6050		
HRM 6060	Organizational Design	
HRM 6070	Global Human Resources Management	

- ² Introduction to Human Resources Management (HRM 6015) is required for students who do not have at least two years of professional experience in human resources. Students with two years or more of professional project experience may substitute electives to satisfy the required program hours.

LEADERSHIP

Code	Title	Hours
Required Courses		
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6135	Ethical Leadership	3
Concentration Electives		
Choose from the following:		6
CMN 6095	Foundations of Developing Cultural Awareness	
HRM 6050		
LDR 6115	Developing Strategic and Authentic Leadership Communication	
LDR 6140	Leadership Strategy, Design, and Practice	
LDR 6145	Developing Sustainable Global Leadership	
LDR 6150	Innovation and Organizational Transformation	

PROJECT MANAGEMENT

Code	Title	Hours
Required Courses		
PJM 5900	Foundations of Project Management ³	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
Concentration Electives		
Choose from the following:		5
PJM 6125	Project Evaluation and Assessment	
PJM 6135	Project Quality Management	
PJM 6140	Managing Troubled Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6810	Principles of Agile Project Management	

- ³ Students with project management experience are not required to take Foundations of Project Management (PJM 5900) and may substitute electives to satisfy the required program hours.

PUBLIC AND MEDIA RELATIONS

Code	Title	Hours
Required Courses		
PBR 6100	Introduction to Public Relations	3
PBR 6135	Public Relations Strategy and Planning	3
PBR 6710	Research: Understanding External Audiences	3
Concentration Electives		
Choose from the following:		7
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6050	Crisis Communication	
CMN 6075	Digital Marketing Analytics	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
PBR 6001	Communications Technology Lab	
PBR 6125	Community Relations and Corporate Social Responsibility	

PBR 6130	Public Relations Content Development
PBR 6140	Advanced Public Relations Content Development

SALES MANAGEMENT

Code	Title	Hours
Required Courses		
LDR 6100	Developing Your Leadership Capability	3
SMT 6010	Building Business Acumen	3
SMT 6020	Managing the Customer Experience	3
SMT 6060	Decision Support and Sales Analytics	3
Concentration Electives		
Complete a minimum of 6 quarter hours from the following:		6
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6060	Negotiation, Mediation, and Facilitation	
EAI 6020	AI System Technologies	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6135	Ethical Leadership	
PJM 5900	Foundations of Project Management	
PJM 6185	Managing Innovation Projects	
PJM 6210	Communication Skills for Project Managers	
SMT 6983	Topics	

SOCIAL MEDIA

Code	Title	Hours
Required Courses		
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
DGM 6285	Interactive Marketing Fundamentals	4
DGM 6290	Social Media and Brand Strategy Implementation	4
Concentration Electives		
Choose from the following:		5
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6075	Digital Marketing Analytics	
CMN 6096	Cultural Communications Lab	
DGM 6168	Usability and Human Interaction	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
PBR 6001	Communications Technology Lab	

Global Studies and International Relations, MS (Boston)

Globalization has created a world of new opportunities for those savvy enough to recognize them and acquire the new skill sets needed for success in international government, consulting, business and industry, nonprofit, and educational sectors.

This program is designed to prepare students for internationally focused positions that range from traditional practitioners of diplomacy; to development workers; to executives employed in the dynamic world of international consultancy, trade, and industry. With courses enriched by classmates from every continent, students are active learners in a collaborative, cross-cultural setting from their very first course.

The core curriculum ensures all students have a solid grounding in foundational courses such as international politics, economics, security, and diplomacy. Students then select from a broad-based menu of concentrations, allowing them to develop specialties. The program culminates in a capstone experience in which students elect to write a thesis, engage in a case study, or undertake short-term travel to conduct intensive field research.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
GST 6100	Globalization and Global Politics and Economics	4
GST 6101	Global Literacy, Culture, and Community	4
GST 6109	Basic Field Research Methods	4
GST 6320	Peace and Conflict	4

Regional Studies Courses

Code	Title	Hours
Complete one of the following:		4
GST 6501	Regional Studies: East Asia	
GST 6502	Regional Studies: Middle East and North Africa	
GST 6503	Regional Studies: Sub-Saharan Africa	
GST 6504	Regional Studies: Europe and Eurasia	
GST 6505	Regional Studies: Southwest and Central Asia	
GST 6506	Regional Studies: Latin America	

Capstone

Code	Title	Hours
Complete one of the following:		4
GST 6920	Case Study in Global Studies	
GST 7990	Thesis	
INT 6900	International Field Study Experience	

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the electives list. *Note:* A minimum of 18–20 quarter hours must be completed within global studies electives.

Concentrations

- Global Health and Development (p.)
- Conflict Resolution (p.)
- Diplomacy (p. 1057)
- International Economics and Consulting (p.)

Electives

Code	Title	Hours
Choose from the following:		
Global Studies Electives		
GST 6102	Global Corporate Social Responsibility	
GST 6105		
GST 6200	The Funders	
GST 6210	The Developers	
GST 6220	Globalization of Emerging Economies	
GST 6300	Security and Terrorism	
GST 6310	Immigration and Labor	
GST 6324	Divided Societies in the Modern World	
GST 6326	International Conflict and Cooperation	
GST 6327	Conflict and Postconflict Development	
GST 6340	The Economics of Development	
GST 6350	Global Economics of Food and Agriculture	
GST 6360	Nuclear Nonproliferation	
GST 6425		
GST 6430	Leadership and Management	
GST 6525		
GST 6550	U.S. Foreign Policy	
GST 6540	Politics of the European Union	

1056 Global Studies and International Relations, MS (Boston)

GST 6560	Multilateral Diplomacy
GST 6580	Opportunities in International Consulting
GST 6590	Public Diplomacy
GST 6600	The Practice of Diplomacy
GST 6610	Sustainable Development
GST 6700	Global Health Perspectives, Politics, and Experiences in International Development
GST 6710	Critical Issues and Challenges in the Practice of Global Health
GST 6740	Human Rights
GST 6810	
GST 6820	
GST 6830	
GST 6840	
GST 6850	
GST 6965	
GST 7983	Topics
Other Electives	
ALY 6000	Introduction to Analytics
ALY 6010	Probability Theory and Introductory Statistics
CED 6120	Environmental Economics
CED 6130	Sustainable Economic Development
CMN 6060	Negotiation, Mediation, and Facilitation
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation
COP 6940	
EDU 6184	
LDR 6145	Developing Sustainable Global Leadership
NPM 6140	Grant and Report Writing
PJM 5900	Foundations of Project Management

Program Credit/GPA Requirements

46 total quarter hours required

Minimum 3.000 GPA required

GLOBAL HEALTH AND DEVELOPMENT

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		20
GST 6210	The Developers	
GST 6340	The Economics of Development	
GST 6350	Global Economics of Food and Agriculture	
GST 6610	Sustainable Development	
GST 6700	Global Health Perspectives, Politics, and Experiences in International Development	
GST 6710	Critical Issues and Challenges in the Practice of Global Health	

CONFLICT RESOLUTION

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		20
GST 6324	Divided Societies in the Modern World	
GST 6326	International Conflict and Cooperation	
GST 6327	Conflict and Postconflict Development	
GST 6300	Security and Terrorism	

GST 6360	Nuclear Nonproliferation
GST 6740	Human Rights

DIPLOMACY

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		20

GST 6600	The Practice of Diplomacy
GST 6540	Politics of the European Union
GST 6550	U.S. Foreign Policy
GST 6560	Multilateral Diplomacy
GST 6590	Public Diplomacy
GST 6740	Human Rights

INTERNATIONAL ECONOMICS AND CONSULTING

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		20

GST 6102	Global Corporate Social Responsibility
GST 6200	The Funders
GST 6220	Globalization of Emerging Economies
GST 6310	Immigration and Labor
GST 6340	The Economics of Development
GST 6430	Leadership and Management
GST 6580	Opportunities in International Consulting

Human Resources Management, MS (Boston)

The human resources management program in the College of Professional Studies is designed to prepare students to make the connection between an organization's strategy and its people and other key stakeholders. The program focuses on vital human resource competencies and analytical skills—with an emphasis on experiential learning—required for students to serve as strategic business partners in their organizations. Students also have the opportunity to tailor their studies to support their specific career objectives.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
Based on your experience, complete one of the two options below:		
Two or more years of human resources experience:		6
HRM 6025	Workforce Analytics	
HRM 6042	Strategic Workforce Planning	
Fewer than two years of experience:		9
HRM 6015	Introduction to Human Resources Management	
HRM 6025	Workforce Analytics	
HRM 6042	Strategic Workforce Planning	

Core Electives

Complete four of the following:		12
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6035	Digital Human Resources Platforms	
HRM 6047	Managing the Employee Life Cycle	
HRM 6050		

HRM 6060	Organizational Design
HRM 6070	Global Human Resources Management

Capstone

Code	Title	Hours
HRM 6940	Projects for Professionals	4

Concentration or Electives

In addition to the core requirements, students may complete either a combination of a concentration and additional electives or selecting any courses in the concentrations and elective lists.

CONCENTRATIONS

- Artificial Intelligence for Human Resources (p. 1058)
- Digital Human Resources (p. 1058)
- Global Talent Management (p. 1059)
- Leadership (p. 1059)
- Organizational Communication (p.)
- Project Management (p. 1060)

ELECTIVES

Code	Title	Hours
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6070	Communication and Visualization for Data Analytics	
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6050	Crisis Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6096	Cultural Communications Lab	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	
COP 6940		
LDR 6101	Leadership Challenge Lab	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

ARTIFICIAL INTELLIGENCE FOR HUMAN RESOURCES

Code	Title	Hours
Required Courses		
EAI 6070	Human Resources Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3
Electives		
Complete two of the following:		6
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6040	Data Mining Applications	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	

DIGITAL HUMAN RESOURCES

Code	Title	Hours
Required Course		
HRM 6035	Digital Human Resources Platforms	3
Electives		
Choose from the following:		13
ALY 6000	Introduction to Analytics	
ALY 6010	Probability Theory and Introductory Statistics	

ALY 6060	Decision Support and Business Intelligence
ALY 6070	Communication and Visualization for Data Analytics
ALY 6110	Data Management and Big Data
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance
CMN 6065	Implementation and Management of Social Media Channels and Online Communities
CMN 6096	Cultural Communications Lab
PBR 6001	Communications Technology Lab

GLOBAL TALENT MANAGEMENT

Code	Title	Hours
Required Course		
HRM 6070	Global Human Resources Management	3
Electives		
Choose from the following:		12
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6096	Cultural Communications Lab	
GST 6101	Global Literacy, Culture, and Community	
HRM 6072	Global and Comparative Employment/Employee Relations	
HRM 6074	Global Talent Acquisition and Mobility	
LDR 6145	Developing Sustainable Global Leadership	
PJM 6145	Global Project Management	

LEADERSHIP

Code	Title	Hours
Required Courses		
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6135	Ethical Leadership	3
Electives		
Complete two of the following:		6
CMN 6095	Foundations of Developing Cultural Awareness	
HRM 6050		
LDR 6115	Developing Strategic and Authentic Leadership Communication	
LDR 6140	Leadership Strategy, Design, and Practice	
LDR 6145	Developing Sustainable Global Leadership	
LDR 6150	Innovation and Organizational Transformation	

ORGANIZATIONAL COMMUNICATION

Code	Title	Hours
Required Courses		
CMN 6010	Strategic Communication Management	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6910	Organizational Communication Assessment	3
Electives		
Choose from the following:		7
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6096	Cultural Communications Lab	
CMN 6100	Communication Networks and Managing Information	
PBR 6001	Communications Technology Lab	

PROJECT MANAGEMENT

Code	Title	Hours
Required Courses		
PJM 5900	Foundations of Project Management ¹	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
Electives		
Choose from the following:		3
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Special Topics	

¹ Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute project management electives to satisfy the required program hours.

Nonprofit Management, MS (Boston)

Facing the threat of privatization and for-profit competition, nonprofit organizations are challenged to find leaders who not only possess keen business and managerial skills but can also effect change at a community or social level. Being successful in this dynamic and rewarding field requires strong leadership, managerial and interpersonal skills, as well as in-depth knowledge of fundraising, marketing, program development, and governance issues.

Integrating theoretical approaches with practical applications, the Master of Science in Nonprofit Management seeks to prepare you for a leadership position in a not-for-profit university, hospital, charity, foundation, or religious organization. Upon completion of this nonprofit degree, you emerge well equipped to embark on a career in nonprofit management—prepared, and inspired, to make a meaningful impact.

The mission of the Master of Science in Nonprofit Management at the College of Professional Studies is to offer courses that further develop the students' knowledge, skills, talent, and abilities. Faculty in the program support students' development goals through action-oriented courses that link theoretical learning to practical application. Nonprofit management courses aim to prepare students to be mission-driven executive leaders, managers, employees, and board members in public and private nonprofit organizations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
NPM 6100	Strategic Management and Leadership for Nonprofit Organizations	3
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	3
NPM 6120	Financial Management for Nonprofit Organizations	3
NPM 6125	Promoting Nonprofit Organizations	3
NPM 6130	Fundraising and Development for Organizations	3
NPM 6140	Grant and Report Writing	3
NPM 6150	Human Resources Management in Nonprofit Organizations	3
NPM 6980	Capstone	3

Concentration or Electives Option

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the electives list (p. 1061).

- Fundraising (p. 1062)
- Leadership and Communication (p. 1062)
- Project Management
- Sales Management
- Social Innovation
- Social Media Analytics (p. 1063)

Electives

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the program.		
Nonprofit Management Electives		
NPM 6210	Social Value Investing and Effective Partnerships	
NPM 6220	Donor Research and Management	
NPM 6230	Measuring Social Impact	
NPM 6240	Managing the Annual Fund	
NPM 6310	Social and Sustainable Entrepreneurship	
NPM 6320	New Ventures in Social Entrepreneurship	
Other Electives		
ALY 6000	Introduction to Analytics	
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6070	Communication and Visualization for Data Analytics	
ALY 6110	Data Management and Big Data	
CMN 6000	Introduction to Organizational Communication	
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6050	Crisis Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6100	Communication Networks and Managing Information	
COP 6940		
DGM 6285	Interactive Marketing Fundamentals	
DGM 6290	Social Media and Brand Strategy Implementation	
EDU 6184		
GST 6610	Sustainable Development	
INT 6000	Writing Lab	
INT 6943	Integrative Experiential Learning	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6120	Developing Organizational Success through Leadership Development	
LDR 6135	Ethical Leadership	
LDR 6140	Leadership Strategy, Design, and Practice	
LDR 6150	Innovation and Organizational Transformation	
PJM 5900	Foundations of Project Management	
PJM 6005	Project Scope Management	
PJM 6015	Project Risk Management	
PJM 6025	Project Scheduling and Cost Planning	
PJM 6135	Project Quality Management	

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

Concentrations**FUNDRAISING**

Code	Title	Hours
Required Courses		
NPM 6210	Social Value Investing and Effective Partnerships	3
NPM 6220	Donor Research and Management	3
NPM 6230	Measuring Social Impact	3
Electives		
Complete a minimum of 6 quarter hours from the following:		6
ALY 6000	Introduction to Analytics	
ALY 6010 and ALY 6070	Probability Theory and Introductory Statistics and Communication and Visualization for Data Analytics	
DGM 6285	Interactive Marketing Fundamentals	
DGM 6290	Social Media and Brand Strategy Implementation	
NPM 6240	Managing the Annual Fund	

LEADERSHIP AND COMMUNICATION

Code	Title	Hours
Required Courses		
CMN 6090	Organizational Culture, Climate, and Communication	3
LDR 6150	Innovation and Organizational Transformation	3
Electives		
Complete a minimum of 9 quarter hours from the following:		9
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6080	Intercultural Communication	
CMN 6100	Communication Networks and Managing Information	
LDR 6120	Developing Organizational Success through Leadership Development	
LDR 6135	Ethical Leadership	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6140	Leadership Strategy, Design, and Practice	

PROJECT MANAGEMENT

Code	Title	Hours
Required Courses		
PJM 5900	Foundations of Project Management ¹	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
Elective		
Complete one of the following: ¹		5
PJM 6125	Project Evaluation and Assessment	
PJM 6135	Project Quality Management	
PJM 6140	Managing Troubled Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6810	Principles of Agile Project Management	

- ¹ *Note:* Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete Foundations of Project Management (PJM 5900) may substitute any additional project management elective to satisfy the required program hours.

SALES MANAGEMENT

Code	Title	Hours
Required Courses		
LDR 6100	Developing Your Leadership Capability	3
SMT 6010	Building Business Acumen	3
SMT 6020	Managing the Customer Experience	3
SMT 6060	Decision Support and Sales Analytics	3
Elective Courses		
Complete a minimum of 6 quarter hours from the following:		6
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6060	Negotiation, Mediation, and Facilitation	
EAI 6020	AI System Technologies	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6135	Ethical Leadership	
PJM 5900	Foundations of Project Management	
PJM 6210	Communication Skills for Project Managers	
PJM 6185	Managing Innovation Projects	
SMT 6983	Topics	

SOCIAL INNOVATION

Code	Title	Hours
Required Courses		
NPM 6230	Measuring Social Impact	3
NPM 6310	Social and Sustainable Entrepreneurship	3
NPM 6320	New Ventures in Social Entrepreneurship	3
Electives		
Complete a minimum of 6 quarter hours from the following:		6
ALY 6000	Introduction to Analytics	
ALY 6010 and ALY 6070	Probability Theory and Introductory Statistics and Communication and Visualization for Data Analytics	
DGM 6285	Interactive Marketing Fundamentals	
DGM 6290	Social Media and Brand Strategy Implementation	
GST 6610	Sustainable Development	
LDR 6120	Developing Organizational Success through Leadership Development	
PJM 5900	Foundations of Project Management	
PJM 6125	Project Evaluation and Assessment	
PJM 6983	Special Topics	

SOCIAL MEDIA ANALYTICS

Code	Title	Hours
Required Courses		
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	3
DGM 6285	Interactive Marketing Fundamentals	4
Electives		
Complete a minimum of 5 quarter hours from the following:		5
ALY 6000	Introduction to Analytics	
ALY 6110 and ALY 6070	Data Management and Big Data and Communication and Visualization for Data Analytics	

ALY 6010

Probability Theory and Introductory Statistics

DGM 6290

Social Media and Brand Strategy Implementation

Organizational Leadership, MS (Boston)

As today's workforce continues to be faced by new challenges, leadership tasks and responsibilities have become more important as well as more complex. The Master of Science in Organizational Leadership uses a practical, experiential learning approach to help students examine and develop their individual leadership styles while building skills that inspire and drive productive activity in all kinds of professional environments. Graduates are well able to perform at a higher level regardless of their position within the organization, demonstrate readiness for promotion, start their own business or consulting practice, take on global strategic and management challenges, and drive organizational change and innovation.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6115	Developing Strategic and Authentic Leadership Communication	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6135	Ethical Leadership	3
LDR 7980	The Capstone: Demonstrating Leadership in Action	4

Concentration or Electives

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective list.

CONCENTRATIONS

- [Coaching](#)
- Health Management (p. 1065)
- Human Resources Management (p. 1065)
- Leading and Managing Technical Projects (p. 1065)
- Organizational Communication (p. 1066)
- Project Management (p. 1066)
- Sales Management (p. 1066)

ELECTIVES

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the Organizational Leadership program.		
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6096	Cultural Communications Lab	
EDU 6184		
HRM 6042	Strategic Workforce Planning	
HRM 6050		
HRM 6070	Global Human Resources Management	
HRM 6074	Global Talent Acquisition and Mobility	
INT 6900	International Field Study Experience	
LDR 6101	Leadership Challenge Lab	
LDR 6140	Leadership Strategy, Design, and Practice	
LDR 6145	Developing Sustainable Global Leadership	
LDR 6150	Innovation and Organizational Transformation	
LDR 6190	Leadership Coaching for Purpose and Performance	
LDR 6983	Topics	

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

COACHING

Code	Title	Hours
LDR 6190	Leadership Coaching for Purpose and Performance	3
LDR 6195	Advanced Leadership Coaching: An Interdisciplinary Approach	3
Complete three of the following:		9
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6095	Foundations of Developing Cultural Awareness	
HRM 6050		
LDR 6150	Innovation and Organizational Transformation	

HEALTH MANAGEMENT

Code	Title	Hours
HMG 6110	Organization, Administration, Financing, and History of Healthcare	3
HMG 6130	Healthcare Strategic Management	3
HMG 6140	Principles of Population-Based Management	3
HMG 6160	Healthcare Information Systems Management	3
HMG 6170	Health Law, Politics, and Policy	3

HUMAN RESOURCES MANAGEMENT

Code	Title	Hours
Required Courses		
HRM 6015	Introduction to Human Resources Management	3
HRM 6025	Workforce Analytics	3
Complete three of the following (students waived out of HRM 6015, complete four of the following):		9-12
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6042	Strategic Workforce Planning	
HRM 6047	Managing the Employee Life Cycle	
HRM 6050		
HRM 6060	Organizational Design	
HRM 6070	Global Human Resources Management	

LEADING AND MANAGING TECHNICAL PROJECTS

Code	Title	Hours
PJM 5900	Foundations of Project Management ¹	4
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3

¹ Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute project management electives from the following list to satisfy the required program hours.

- Project Evaluation and Assessment (PJM 6125)
- Project Quality Management (PJM 6135)
- Managing Troubled Projects (PJM 6140)
- Introduction to Program and Portfolio Management (PJM 6710)

ORGANIZATIONAL COMMUNICATION

Code	Title	Hours
CMN 6000	Introduction to Organizational Communication	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6050	Crisis Communication	3
CMN 6090	Organizational Culture, Climate, and Communication	3
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	3
INT 6000	Writing Lab	1

PROJECT MANAGEMENT

Code	Title	Hours
Required Courses		
PJM 5900	Foundations of Project Management ²	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
Electives		3
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Special Topics	

² Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute project management electives to satisfy the required program hours.

SALES MANAGEMENT

Code	Title	Hours
Required Courses		
LDR 6100	Developing Your Leadership Capability	3
SMT 6010	Building Business Acumen	3
SMT 6020	Managing the Customer Experience	3
SMT 6060	Decision Support and Sales Analytics	3
Elective Courses		
Complete a minimum 6 quarter hours from the following:		6
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6060	Negotiation, Mediation, and Facilitation	
EAI 6020	AI System Technologies	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6135	Ethical Leadership	
PJM 5900	Foundations of Project Management	
PJM 6210	Communication Skills for Project Managers	
PJM 6185	Managing Innovation Projects	
SMT 6983	Topics	

Project Management, MS (Arlington)

Companies succeed or fail based on their ability to bring quality products and services to market in a timely manner. Without skilled project managers in place, companies are challenged to deliver projects on time, on budget, and according to specifications. From inception to completion, project managers are responsible for every step in the process: project definition, cost and risk estimation, schedule planning and monitoring, budget management, negotiation and conflict resolution, project leadership, and project presentation and evaluation.

The Master of Science in Project Management is designed to provide you with the practical skills and theoretical concepts you need to lead complex projects. Featuring real-world case studies, this project management degree presents techniques and tools for managing long- and short-term projects successfully and cost-effectively. Augmenting the core project management courses are concentrations that seek to provide you with content-specific expertise that enables you to deepen your knowledge in your field of interest.

In October of 2021, the Master of Science in Project Management accreditation was re-affirmed for the maximum five-year accreditation cycle (originally accredited in 2009) by the Project Management Institute Global Accreditation Center for Project Management Education Programs (GAC) (<https://www.pmi.org/>), the world's leading association for project management professionals. Accreditation is achieved by meeting the GAC's rigorous standards, which include an assessment of program objectives and outcomes, a review of onsite and online resources, evaluations of faculty and students, and proof of continuous improvements in the area of project management.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
PJM 6135	Project Quality Management	3
PJM 6910	Capstone	3

Concentrations or Electives Option

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and electives or a combination of electives and any courses listed in the concentrations.

CONCENTRATIONS

- Agile Project Management (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/project-management-ms/#agile>)
- Analytics (p. 1068)

ELECTIVES

Code	Title	Hours
CMN 6000	Introduction to Organizational Communication	
CMN 6005	Foundations of Professional Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6185	Managing Innovation Projects	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	

PJM 6215	Leading Remote Project Teams
PJM 6710	Introduction to Program and Portfolio Management
PJM 6983	Special Topics

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

AGILE PROJECT MANAGEMENT CONCENTRATION

Code	Title	Hours
PJM 6205	Leading and Managing Technical Projects	3
PJM 6810	Principles of Agile Project Management	3
PJM 6815	Advanced Agile Project Management	3
PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3

ANALYTICS CONCENTRATION

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3

Complete one of the following:

ALY 6020	Predictive Analytics	3
ALY 6030	Data Warehousing and SQL	3
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3

Project Management, MS (Boston)

Companies succeed or fail based on their ability to bring quality products and services to market in a timely manner. Without skilled project managers in place, companies are challenged to deliver projects on time, on budget, and according to specifications. From inception to completion, project managers are responsible for every step in the process: project definition, cost and risk estimation, schedule planning and monitoring, budget management, negotiation and conflict resolution, project leadership, and project presentation and evaluation.

The Master of Science in Project Management is designed to provide you with the practical skills and theoretical concepts you need to lead complex projects. Featuring real-world case studies, this project management degree presents techniques and tools for managing long- and short-term projects successfully and cost-effectively. Augmenting the core project management courses are concentrations that seek to provide you with content-specific expertise that enables you to deepen your knowledge in your field of interest.

In October of 2021, the Master of Science in Project Management accreditation was re-affirmed for the maximum five-year accreditation cycle (originally accredited in 2009) by the Project Management Institute Global Accreditation Center for Project Management Education Programs (GAC) (<https://www.pmi.org/>), the world's leading association for project management professionals. Accreditation is achieved by meeting the GAC's rigorous standards, which include an assessment of program objectives and outcomes, a review of onsite and online resources, evaluations of faculty and students, and proof of continuous improvements in the area of project management.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management ¹	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
PJM 6135	Project Quality Management	3

The following course should be taken last:

PJM 6910	Capstone	3

- ¹ Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute project management electives to satisfy the required program hours.

Concentration or Electives

The remaining required quarter hours for the program may be completed by a combination of completing a concentration, project management electives, and 6000-level electives or a combination of project management electives and selecting any courses listed in the concentrations and electives lists.

CONCENTRATIONS

- Agile Project Management (p. 1070)
- Analytics (p. 1070)
- Construction Management (p. 1070)
- Leadership (p. 1070)
- Leading and Managing Technical Projects (p.)
- Organizational Communication (p.)
- Project Business Analysis (p.)

PROJECT MANAGEMENT ELECTIVES

Code	Title	Hours
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6185	Managing Innovation Projects	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Special Topics	

ELECTIVES LIST

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the project management program:		
CMN 6000	Introduction to Organizational Communication	
CMN 6005	Foundations of Professional Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	
COP 6940		
EDU 6184		
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

CONCENTRATION IN AGILE PROJECT MANAGEMENT

Code	Title	Hours
Students in this concentration are only required to complete one project management required elective.		
PJM 6205	Leading and Managing Technical Projects	3
PJM 6810	Principles of Agile Project Management	3
PJM 6815	Advanced Agile Project Management	3
PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3

CONCENTRATION IN ANALYTICS

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete one of the following:		3
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

CONCENTRATION IN CONSTRUCTION MANAGEMENT

Code	Title	Hours
CMG 6400	Introduction to Construction Management	4
CMG 6402	Alternative Project Delivery Methods and Project Controls	4
CMG 6403	Safety, Project Risk, and Quality Management	4
CMG 6405	Construction Law	4

CONCENTRATION IN LEADERSHIP

Code	Title	Hours
Required Courses		
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6150	Innovation and Organizational Transformation	3
Elective		
Complete one of the following:		3
LDR 6135	Ethical Leadership	
LDR 6140	Leadership Strategy, Design, and Practice	

CONCENTRATION IN LEADING AND MANAGING TECHNICAL PROJECTS

Code	Title	Hours
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3
PJM 6825	Agile Lean Product Development	3

CONCENTRATION IN ORGANIZATIONAL COMMUNICATION

Code	Title	Hours
Required Course		
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	4
Electives		
Complete four of the following:		12

CMN 6020	Ethical Issues in Organizational Communication
CMN 6050	Crisis Communication
CMN 6060	Negotiation, Mediation, and Facilitation
CMN 6080	Intercultural Communication
CMN 6090	Organizational Culture, Climate, and Communication
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management

CONCENTRATION IN PROJECT BUSINESS ANALYSIS

Code	Title	Hours
PJM 6185	Managing Innovation Projects	3
PJM 6610	Foundations of Project Business Analysis	3
PJM 6620	Strategy Analysis and Needs Assessment	3
PJM 6630	Requirements Analysis and Design	3
PJM 6640	Leadership Strategies for the Business Analyst	3

Project Management, MS (Miami)

Companies succeed or fail based on their ability to bring quality products and services to market in a timely manner. Without skilled project managers in place, companies are challenged to deliver projects on time, on budget, and according to specifications. From inception to completion, project managers are responsible for every step in the process: project definition, cost and risk estimation, schedule planning and monitoring, budget management, negotiation and conflict resolution, project leadership, and project presentation and evaluation.

The Master of Science in Project Management is designed to provide you with the practical skills and theoretical concepts you need to lead complex projects. Featuring real-world case studies, this project management degree presents techniques and tools for managing long- and short-term projects successfully and cost-effectively. Augmenting the core project management courses are concentrations that seek to provide you with content-specific expertise that enables you to deepen your knowledge in your field of interest.

In October of 2021, the Master of Science in Project Management accreditation was re-affirmed for the maximum five-year accreditation cycle (originally accredited in 2009) by the Project Management Institute Global Accreditation Center for Project Management Education Programs (GAC) (<https://www.pmi.org/>), the world's leading association for project management professionals. Accreditation is achieved by meeting the GAC's rigorous standards, which include an assessment of program objectives and outcomes, a review of onsite and online resources, evaluations of faculty and students, and proof of continuous improvements in the area of project management.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management ¹	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
PJM 6135	Project Quality Management	3
The following should be the final course:		
PJM 6910	Capstone	3

¹ Foundations of Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute project management electives to satisfy the required program hours.

Concentration or Electives Option

The remaining required quarter hours for the program may be completed by a combination of completing a concentration, project management electives, and 6000-level electives or a combination of project management electives and selecting any courses listed in the concentrations and electives lists.

CONCENTRATIONS

- Leading and Managing Technical Projects (p. 1072)
- Project Business Analysis (p. 1072)

PROJECT MANAGEMENT ELECTIVES

Code	Title	Hours
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6185	Managing Innovation Projects	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Special Topics	

RESTRICTED ELECTIVES

Code	Title	Hours
CMN 6000	Introduction to Organizational Communication	
CMN 6005	Foundations of Professional Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

LEADING AND MANAGING TECHNICAL PROJECTS CONCENTRATION

Code	Title	Hours
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3
PJM 6825	Agile Lean Product Development	3

PROJECT BUSINESS ANALYSIS CONCENTRATION

Code	Title	Hours
PJM 6185	Managing Innovation Projects	3
PJM 6610	Foundations of Project Business Analysis	3
PJM 6620	Strategy Analysis and Needs Assessment	3
PJM 6630	Requirements Analysis and Design	3
PJM 6640	Leadership Strategies for the Business Analyst	3

Project Management, MS (Portland)

Companies succeed or fail based on their ability to bring quality products and services to market in a timely manner. Without skilled project managers in place, companies are challenged to deliver projects on time, on budget, and according to specifications. From inception to completion, project managers are responsible for every step in the process: project definition, cost and risk estimation, schedule planning and monitoring, budget management, negotiation and conflict resolution, project leadership, and project presentation and evaluation.

The Master of Science in Project Management is designed to provide you with the practical skills and theoretical concepts you need to lead complex projects. Featuring real-world case studies, this project management degree presents techniques and tools for managing long- and short-term projects

successfully and cost-effectively. Augmenting the core project management courses are concentrations that seek to provide you with content-specific expertise that enables you to deepen your knowledge in your field of interest.

In October of 2021, the Master of Science in Project Management accreditation was re-affirmed for the maximum five-year accreditation cycle (originally accredited in 2009) by the Project Management Institute Global Accreditation Center for Project Management Education Programs (GAC) (<https://www.pmi.org/>), the world's leading association for project management professionals. Accreditation is achieved by meeting the GAC's rigorous standards, which include an assessment of program objectives and outcomes, a review of onsite and online resources, evaluations of faculty and students, and proof of continuous improvements in the area of project management.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management ¹	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
PJM 6135	Project Quality Management	3
The following should be the final course:		
PJM 6910	Capstone	3

¹ Foundations of Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute project management electives to satisfy the required program hours.

Concentrations or Electives Option

The remaining required quarter hours for the program may be completed by a combination of completing a concentration, project management electives, and 6000-level electives or a combination of project management electives and selecting any courses listed in the concentrations and electives lists.

CONCENTRATIONS

- Agile Project Management (p. 1074)
- Analytics (p. 1074)
- Construction Management (p. 1074)
- Leadership (p. 1074)
- Leading and Managing Technical Projects (p. 1074)
- Organizational Communication (p. 1075)
- Project Business Analysis (p. 1075)

PROJECT MANAGEMENT ELECTIVES

Code	Title	Hours
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6185	Managing Innovation Projects	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Special Topics	

RESTRICTED ELECTIVES

Code	Title	Hours
CMN 6000	Introduction to Organizational Communication	
CMN 6005	Foundations of Professional Communication	

CMN 6060	Negotiation, Mediation, and Facilitation
CMN 6090	Organizational Culture, Climate, and Communication
CMN 6095	Foundations of Developing Cultural Awareness
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management
INT 6940	Experiential Learning Projects for Professionals
INT 6943	Integrative Experiential Learning

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

CONCENTRATION IN AGILE PROJECT MANAGEMENT

Code	Title	Hours
PJM 6205	Leading and Managing Technical Projects	3
PJM 6810	Principles of Agile Project Management	3
PJM 6815	Advanced Agile Project Management	3
PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3

CONCENTRATION IN ANALYTICS

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete one of the following:		3
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

CONCENTRATION IN CONSTRUCTION MANAGEMENT

Code	Title	Hours
CMG 6400	Introduction to Construction Management	4
CMG 6402	Alternative Project Delivery Methods and Project Controls	4
CMG 6403	Safety, Project Risk, and Quality Management	4
CMG 6405	Construction Law	4

CONCENTRATION IN LEADERSHIP

Code	Title	Hours
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6150	Innovation and Organizational Transformation	3
Complete one of the following:		3
LDR 6135	Ethical Leadership	
LDR 6140	Leadership Strategy, Design, and Practice	

CONCENTRATION IN LEADING AND MANAGING TECHNICAL PROJECTS

Code	Title	Hours
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3
PJM 6825	Agile Lean Product Development	3

CONCENTRATION IN ORGANIZATIONAL COMMUNICATION

Code	Title	Hours
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	4
Complete four of the following:		12
CMN 6020	Ethical Issues in Organizational Communication	
CMN 6050	Crisis Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	

CONCENTRATION IN PROJECT BUSINESS ANALYSIS

Code	Title	Hours
PJM 6185	Managing Innovation Projects	3
PJM 6610	Foundations of Project Business Analysis	3
PJM 6620	Strategy Analysis and Needs Assessment	3
PJM 6630	Requirements Analysis and Design	3
PJM 6640	Leadership Strategies for the Business Analyst	3

Project Management, MS (Seattle)

Companies succeed or fail based on their ability to bring quality products and services to market in a timely manner. Without skilled project managers in place, companies are challenged to deliver projects on time, on budget, and according to specifications. From inception to completion, project managers are responsible for every step in the process: project definition, cost and risk estimation, schedule planning and monitoring, budget management, negotiation and conflict resolution, project leadership, and project presentation and evaluation.

The Master of Science in Project Management is designed to provide you with the practical skills and theoretical concepts you need to lead complex projects. Featuring real-world case studies, this project management degree presents techniques and tools for managing long- and short-term projects successfully and cost-effectively. Augmenting the core project management courses are concentrations that seek to provide you with content-specific expertise that enables you to deepen your knowledge in your field of interest.

In October of 2021, the Master of Science in Project Management accreditation was re-affirmed for the maximum five-year accreditation cycle (originally accredited in 2009) by the Project Management Institute Global Accreditation Center for Project Management Education Programs (GAC) (<https://www.pmi.org/>), the world's leading association for project management professionals. Accreditation is achieved by meeting the GAC's rigorous standards, which include an assessment of program objectives and outcomes, a review of onsite and online resources, evaluations of faculty and students, and proof of continuous improvements in the area of project management.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management ¹	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
PJM 6135	Project Quality Management	3
The following course should be taken last:		
PJM 6910	Capstone	3

¹ Note: Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks and is recommended for students who do not have a basic working knowledge of Microsoft Project software. Students who do not complete PJM 5900 may take any project management elective to satisfy the required credits.

Concentrations or Electives Option

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and electives or a combination of electives and any courses listed in the concentrations.

CONCENTRATIONS

- Agile Project Management (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/project-management-ms/#agile>)
- Analytics (p. 1076)

ELECTIVES

Code	Title	Hours
CMN 6000	Introduction to Organizational Communication	
CMN 6005	Foundations of Professional Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6185	Managing Innovation Projects	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Special Topics	

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

AGILE PROJECT MANAGEMENT CONCENTRATION

Code	Title	Hours
Students who take this concentration will have only one required 3 QH elective course.		
PJM 6205	Leading and Managing Technical Projects	3
PJM 6810	Principles of Agile Project Management	3
PJM 6815	Advanced Agile Project Management	3
PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3
CMN 6060	Negotiation, Mediation, and Facilitation	3

ANALYTICS CONCENTRATION

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete one of the following:		3
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

Project Management, MS (Silicon Valley)

Companies succeed or fail based on their ability to bring quality products and services to market in a timely manner. Without skilled project managers in place, companies are challenged to deliver projects on time, on budget, and according to specifications. From inception to completion, project managers are responsible for every step in the process: project definition, cost and risk estimation, schedule planning and monitoring, budget management, negotiation and conflict resolution, project leadership, and project presentation and evaluation.

The Master of Science in Project Management is designed to provide you with the practical skills and theoretical concepts you need to lead complex projects. Featuring real-world case studies, this project management degree presents techniques and tools for managing long- and short-term projects successfully and cost-effectively. Augmenting the core project management courses are concentrations that seek to provide you with content-specific expertise that enables you to deepen your knowledge in your field of interest.

In October of 2021, the Master of Science in Project Management accreditation was re-affirmed for the maximum five-year accreditation cycle (originally accredited in 2009) by the Project Management Institute Global Accreditation Center for Project Management Education Programs (GAC) (<https://www.pmi.org/>), the world's leading association for project management professionals. Accreditation is achieved by meeting the GAC's rigorous standards, which include an assessment of program objectives and outcomes, a review of onsite and online resources, evaluations of faculty and students, and proof of continuous improvements in the area of project management.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management	4
PJM 6000	Project Management Practices	3
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
PJM 6135	Project Quality Management	3
PJM 6910	Capstone	3

Concentrations or Electives Option

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and electives or a combination of electives and any courses listed in the concentrations.

CONCENTRATIONS

- Agile Project Management (<https://catalog.northeastern.edu/graduate/professional-studies/masters-degree-programs/project-management-ms/#agile>)
- Analytics (p. 1078)

ELECTIVES

Code	Title	Hours
CMN 6000	Introduction to Organizational Communication	
CMN 6005	Foundations of Professional Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	
INT 6000	Writing Lab	
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	

PJM 6185	Managing Innovation Projects
PJM 6205	Leading and Managing Technical Projects
PJM 6210	Communication Skills for Project Managers
PJM 6215	Leading Remote Project Teams
PJM 6710	Introduction to Program and Portfolio Management
PJM 6983	Special Topics

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

AGILE PROJECT MANAGEMENT CONCENTRATION

Code	Title	Hours
PJM 6205	Leading and Managing Technical Projects	3
PJM 6810	Principles of Agile Project Management	3
PJM 6815	Advanced Agile Project Management	3
PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3

ANALYTICS CONCENTRATION

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete one of the following:		3
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

Project Management, MS (Toronto)

Companies succeed or fail based on their ability to bring quality products and services to market in a timely manner. Without skilled project managers in place, companies are challenged to deliver projects on time, on budget, and according to specifications. From inception to completion, project managers are responsible for every step in the process: project definition, cost and risk estimation, schedule planning and monitoring, budget management, negotiation and conflict resolution, project leadership, and project presentation and evaluation.

The Master of Science in Project Management is designed to provide you with the practical skills and theoretical concepts you need to lead complex projects. Featuring real-world case studies, this project management degree presents techniques and tools for managing long- and short-term projects successfully and cost-effectively. Augmenting the core project management courses are concentrations that seek to provide you with content-specific expertise that enables you to deepen your knowledge in your field of interest.

In October of 2021, the Master of Science in Project Management accreditation was re-affirmed for the maximum five-year accreditation cycle (originally accredited in 2009) by the Project Management Institute Global Accreditation Center for Project Management Education Programs (GAC) (<https://www.pmi.org/>), the world's leading association for project management professionals. Accreditation is achieved by meeting the GAC's rigorous standards, which include an assessment of program objectives and outcomes, a review of onsite and online resources, evaluations of faculty and students, and proof of continuous improvements in the area of project management.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management ¹	4
PJM 6000	Project Management Practices	3
PJM 6005	Project Scope Management	3

PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
PJM 6135	Project Quality Management	3
PJM 6910	Capstone	3

¹ Foundations of Project Management (PJM 5900 (<https://catalog.northeastern.edu/search/?P=PJM%205900>)) is for students with less than three years of experience directing or leading project tasks. Students who do not complete Foundations of Project Management (PJM 5900) may substitute project management electives to satisfy the required program hours.

Concentration or Electives

The remaining required quarter hours for the program may be completed by a combination of a concentration, project management electives (p. 1079), and 6000-level restricted electives (p. 1079) or a combination of project management electives (p. 1079) and selecting any courses listed in the concentrations and electives lists.

CONCENTRATIONS

- Agile Project Management (p. 1079)
- Analytics (p. 1080)
- Construction Management (p. 1080)
- Leadership (p. 1080)
- Leading and Managing Technical Projects (p. 1080)
- Organizational Communication (p. 1080)
- Project Business Analysis (p. 1080)

PROJECT MANAGEMENT ELECTIVES

Code	Title	Hours
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Special Topics	

RESTRICTED ELECTIVES

Code	Title	Hours
CMN 6000	Introduction to Organizational Communication	
CMN 6005	Foundations of Professional Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	

Program Credit/GPA Requirements

45 total quarter hours required
Minimum 3.000 GPA required

CONCENTRATION IN AGILE PROJECT MANAGEMENT

Code	Title	Hours
PJM 6205	Leading and Managing Technical Projects	3
PJM 6810	Principles of Agile Project Management	3

PJM 6815	Advanced Agile Project Management	3
PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3

CONCENTRATION IN ANALYTICS

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3

Complete one of the following: 3

ALY 6020	Predictive Analytics
ALY 6030	Data Warehousing and SQL
ALY 6040	Data Mining Applications
ALY 6110	Data Management and Big Data

CONCENTRATION IN CONSTRUCTION MANAGEMENT

Code	Title	Hours
CMG 6400	Introduction to Construction Management	4
CMG 6402	Alternative Project Delivery Methods and Project Controls	4
CMG 6403	Safety, Project Risk, and Quality Management	4
CMG 6405	Construction Law	4

CONCENTRATION IN LEADERSHIP

Code	Title	Hours
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6150	Innovation and Organizational Transformation	3

Choose one of the following: 3

LDR 6135	Ethical Leadership
LDR 6140	Leadership Strategy, Design, and Practice

CONCENTRATION IN LEADING AND MANAGING TECHNICAL PROJECTS

Code	Title	Hours
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3
PJM 6825	Agile Lean Product Development	3

CONCENTRATION IN ORGANIZATIONAL COMMUNICATION

Code	Title	Hours
CMN 6000	Introduction to Organizational Communication	3
INT 6000	Writing Lab	1

Complete four courses from the following options: 12

CMN 6020	Ethical Issues in Organizational Communication
CMN 6050	Crisis Communication
CMN 6060	Negotiation, Mediation, and Facilitation
CMN 6080	Intercultural Communication
CMN 6090	Organizational Culture, Climate, and Communication
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management

CONCENTRATION IN PROJECT BUSINESS ANALYSIS

Code	Title	Hours
PJM 6185	Managing Innovation Projects	3
PJM 6610	Foundations of Project Business Analysis	3

PJM 6620	Strategy Analysis and Needs Assessment	3
PJM 6630	Requirements Analysis and Design	3
PJM 6640	Leadership Strategies for the Business Analyst	3

Regulatory Affairs, MS (Boston)

The rapid advancement of technology within healthcare and other sectors has driven the evolution of a complex global regulatory landscape and concurrently created the need for professionals with the skills necessary to facilitate the commercialization of products used therein. In response to this demand, Northeastern University's College of Professional Studies offers the Master of Science in Regulatory Affairs degree.

This unique graduate degree is designed to both broaden and deepen the student's understanding of current global compliance requirements and their practical application in the design, development, approval, and postmarketing of products utilized within regulated industries. Courses within this degree program offer students an opportunity to integrate scientific and technical knowledge and engineering and regulatory perspectives within the larger context of global product commercialization. From research and discovery through the postmarket phase of product utilization, the Master of Science in Regulatory Affairs degree examines the processes required for stakeholders to maintain compliance to product standards and regulations throughout the global marketplace.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
BTC 6210	Human Experimentation: Methodological Issues Fundamentals	4
RGA 6002	Introduction to Regulatory Compliance and Practice	2
RGA 6203 or RGA 6204	Pharmaceutical and Medical Device Law: Topics and Cases Legal Issues in International Food, Drug, and Medical Device Regulation	5
RGA 6212	Introduction to Safety Sciences	4
RGA 6463	Regulatory Strategy for Product Development and Life-Cycle Management	4

Capstone

Code	Title	Hours
RGA 6300	Practical Applications in Global Regulatory Affairs	4

The remaining quarter hours may be completed by selecting a combination of a concentration and additional electives or selecting any courses listed in the concentrations and electives lists.

Concentrations

- Biopharmaceutical Regulatory Affairs (p. 1082)
- Clinical Research Regulatory Affairs (p. 1082)
- Medical Device Regulatory Affairs (p. 1082)
- Nonclinical Biomedical Product Regulation (p. 1082)
- Quality Assurance Compliance (p.)

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

Elective Courses

Code	Title	Hours
General Electives		
COP 6940		
EDU 6184		
INT 6943	Integrative Experiential Learning	
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	
RGA 6215	Project Management in Early Drug Discovery and Development	
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6219	Advanced Topics in Advertising and Promotion of Drugs and Medical Devices	

RGA 6255	
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA
Regulatory Affairs of Food	
GST 6350	Global Economics of Food and Agriculture
GST 6610	Sustainable Development
GST 6102	Global Corporate Social Responsibility
RFA 6220	
International Regulatory Affairs	
RGA 6221	European Union Compliance Process and Regulatory Affairs
RGA 6222	European Medical Device Regulations
RGA 6223	Introduction to Australian, Asian, and Latin American Regulatory Affairs
RGA 6224	Regulation of Biomedical Product Commercialization by Health Canada
RGA 6228	Managing International Clinical Trials
RGA 6228	Managing International Clinical Trials
RGA 6243	Medical Device Product Development in Canada
RGA 6244	Therapeutic Product Development in Canada

Concentrations

BIOPHARMACEUTICAL REGULATORY AFFAIRS

Code	Title	Hours
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6380	Advanced Regulatory Writing: New Drug Applications	4
Complete one of the following:		4
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6235	Emerging Product Categories in the Regulation of Drugs and Biologics	

CLINICAL RESEARCH REGULATORY AFFAIRS

Code	Title	Hours
BTC 6211	Validation and Auditing of Clinical Trial Information	4
BTC 6213	Clinical Trial Design Optimization and Problem Solving	4
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
or RGA 6202	Medical Device Development: A Regulatory Overview	
Complete one of the following:		4
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6228	Managing International Clinical Trials	

MEDICAL DEVICE REGULATORY AFFAIRS

Code	Title	Hours
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	2
RGA 6202	Medical Device Development: A Regulatory Overview	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
Complete one of the following:		6
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6222	European Medical Device Regulations	
RGA 6243	Medical Device Product Development in Canada	
RGA 6275	Product Development and Process Validation	
RGA 6370	Advanced Regulatory Writing: Medical Device Submissions	

NONCLINICAL BIOMEDICAL PRODUCT REGULATION

Code	Title	Hours
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4

RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization	4
RGA 6420	Global IVD Regulations and Submissions	4

QUALITY ASSURANCE COMPLIANCE

Code	Title	Hours
Complete one of the following:		2
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA	
Complete the following:		
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
RGA 6234	Risk Management: Compliance and Processes	4
RGA 6275	Product Development and Process Validation	2
Choose from the following to reach 16 quarter hours:		4
RGA 6221	European Union Compliance Process and Regulatory Affairs	
RGA 6410	Fundamentals of CMC Regulations and Methods	
RFA 6220		

Regulatory Affairs, MS (Toronto)

The rapid advancement of technology within healthcare and other sectors has driven the evolution of a complex global regulatory landscape and concurrently created the need for professionals with the skills necessary to facilitate the commercialization of products used therein. In response to this demand, Northeastern University's College of Professional Studies offers the Master of Science in Regulatory Affairs degree.

This unique graduate degree is designed to both broaden and deepen the student's understanding of current global compliance requirements and their practical application in the design, development, approval, and post-marketing of products utilized within regulated industries. Courses within this degree program offer students an opportunity to integrate scientific and technical knowledge and engineering and regulatory perspectives within the larger context of global product commercialization. From research and discovery through the post-market phase of product utilization, the Master of Science in Regulatory Affairs degree examines the processes required for stakeholders to maintain compliance to product standards and regulations throughout the global marketplace.

Program Requirements**Required Courses**

Code	Title	Hours
BTC 6210	Human Experimentation: Methodological Issues Fundamentals	4
RGA 6002	Introduction to Regulatory Compliance and Practice	2
RGA 6300	Practical Applications in Global Regulatory Affairs	4
RGA 6212	Introduction to Safety Sciences	4
RGA 6463	Regulatory Strategy for Product Development and Life-Cycle Management	4
Complete one of the following:		5
RGA 6203	Pharmaceutical and Medical Device Law: Topics and Cases	
RGA 6204	Legal Issues in International Food, Drug, and Medical Device Regulation	

Concentrations

A concentration is not required. The remaining required quarter hours for this program may be completed by selecting a combination of a concentration and electives or selecting any courses listed in the concentrations and electives.

- Biopharmaceutical Regulatory Affairs (p. 1084)
- Clinical Research Regulatory Affairs (p. 1084)
- Medical Device Regulatory Affairs (p. 1084)
- Nonclinical Biomedical Product Regulation (p. 1084)
- Quality Assurance and Compliance (p. 1084)

PROGRAM CREDIT/GPA REQUIREMENTS

45 total quarter hours required

Minimum 3.000 GPA required

CONCENTRATION IN BIOPHARMACEUTICAL REGULATORY AFFAIRS

Code	Title	Hours
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
Complete one of the following:		4
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6235	Emerging Product Categories in the Regulation of Drugs and Biologics	

CONCENTRATION IN CLINICAL RESEARCH REGULATORY AFFAIRS

Code	Title	Hours
BTC 6211	Validation and Auditing of Clinical Trial Information	4
BTC 6213	Clinical Trial Design Optimization and Problem Solving	4
Complete one of the following:		2
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	
Complete one of the following:		4
RGA 6101	Therapeutic Product Development: A Regulatory Overview	
RGA 6202	Medical Device Development: A Regulatory Overview	
RGA 6228	Managing International Clinical Trials	

CONCENTRATION IN MEDICAL DEVICE REGULATORY AFFAIRS

Code	Title	Hours
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	2
RGA 6202	Medical Device Development: A Regulatory Overview	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
Complete one of the following:		2-4
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6222	European Medical Device Regulations	
RGA 6243	Medical Device Product Development in Canada	
RGA 6275	Product Development and Process Validation	
RGA 6370	Advanced Regulatory Writing: Medical Device Submissions	

CONCENTRATION IN NONCLINICAL BIOMEDICAL PRODUCT REGULATION

Code	Title	Hours
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization	4
Choose one of the following:		2
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	

CONCENTRATION IN QUALITY ASSURANCE AND COMPLIANCE

Code	Title	Hours
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
RGA 6234	Risk Management: Compliance and Processes	4
Complete one of the following:		2
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA	
Complete one of the following:		4
RGA 6221	European Union Compliance Process and Regulatory Affairs	
RGA 6410	Fundamentals of CMC Regulations and Methods	

Electives

Code	Title	Hours
INT 6200	Experiential Project Preparation	
RGA 6219	Advanced Topics in Advertising and Promotion of Drugs and Medical Devices	
RGA 6244	Therapeutic Product Development in Canada	

Sports Leadership, MSLD (Boston)

The practice-oriented sports leadership master's degree is structured to accommodate midcareer athletic administrators and coaches, as well as individuals seeking to prepare for careers in the sports industry.

Developed in collaboration with Northeastern University's Center for the Study of Sport in Society, the Master of Sports Leadership seeks to prepare you for a variety of sport-related occupations—whether it's working with a professional or intercollegiate sports team; with a fitness club or wellness organization; or in marketing, communication, or sports management. Courses within this unique graduate degree examine the social and business issues that are critical to sports leadership. Offered in an online format with intensive one-week institutes in Boston and Charlotte, this practice-oriented degree seeks to provide you with a well-rounded educational experience, equipping you to advance your career in the sports industry.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LDR 6400	Sports Management	3
LDR 6405	Sport in Society ¹	3
LDR 6410	Leadership and Organization in Sport	3
LDR 6430	Sports Law	3
LDR 6441	Sports Media Relations ¹	3

¹ Summer institute course are delivered on-ground on the Boston campus. Winter institute [courses are delivered on-ground on the Charlotte campus.](#)

Internship/Capstone

Code	Title	Hours
Complete one of the following. This course should be the last course taken and requires faculty advisor approval:		3
LDR 6961	Internship	
LDR 6980	Capstone	

The remaining 27 of 45 quarter hours may be completed by a combination of completing a concentration and additional electives or by selecting any courses listed in the concentrations and electives lists.

Concentrations

- Professional Sports Administration (p. 1086)
- Collegiate Athletics Administration (p. 1086)
- Analytics (p. 1086)
- eSports (p. 1086)

Electives List

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the Sports Leadership program:		
ALY 6000	Introduction to Analytics	
ALY 6015	Intermediate Analytics	
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6070	Communication and Visualization for Data Analytics	
CMN 6040	Consumer Behaviors in the Online Environment	
DGM 6400	Game Design Fundamentals	

DGM 6516	Virtual and Augmented Reality (VR/AR)
EDU 6184	
INT 6943	Integrative Experiential Learning
LDR 6323	Event Management
LDR 6427	Gender and Diversity in Sport
LDR 6435	Fiscal Practices in Sports
LDR 6440	Sports Marketing and Promotions
LDR 6442	Athletic Fund-Raising
LDR 6443	Ticket Sales and Strategies
LDR 6445	Corporate Sponsorships
LDR 6465	Title IX
LDR 6455	NCAA Compliance
LDR 6470	Bystander Strategies for the Prevention of Gender-Based Violence
LDR 6480	The Business of eSports
LDR 6615	Academic Advising for Student-Athletes

Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

PROFESSIONAL SPORTS ADMINISTRATION

Code	Title	Hours
LDR 6323	Event Management	3
LDR 6435	Fiscal Practices in Sports	3
LDR 6440	Sports Marketing and Promotions	3
LDR 6445	Corporate Sponsorships	3
LDR 6443	Ticket Sales and Strategies	3
LDR 6460	Risk Management in Athletics	3

COLLEGIATE ATHLETICS ADMINISTRATION

Code	Title	Hours
LDR 6427	Gender and Diversity in Sport	3
LDR 6442	Athletic Fund-Raising	3
LDR 6455	NCAA Compliance	3
LDR 6465	Title IX	3
LDR 6470	Bystander Strategies for the Prevention of Gender-Based Violence	3
LDR 6615	Academic Advising for Student-Athletes	3

ANALYTICS

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete two of the following:		6
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

ESPORTS

Code	Title	Hours
CMN 6040	Consumer Behaviors in the Online Environment	3
LDR 6323	Event Management	3
LDR 6480	The Business of eSports	3
LDR 6445	Corporate Sponsorships	3

DGM 6400	Game Design Fundamentals	4
DGM 6516	Virtual and Augmented Reality (VR/AR)	2

Graduate Certificate Programs

Gain a competitive advantage and stand out in the job market with a graduate certificate from Northeastern University's College of Professional Studies. With over 40 certificates available in fields such as education, project management, leadership, and technology, you'll find a flexible and convenient way to build your skills and career potential. To accommodate your life, courses are offered online, on campus, or in a hybrid format.

Programs

- 3D Animation (Boston) (p. 1088)
- Agile Project Management (Boston) (p. 1088)
- Applied Analytics (Boston) (p. 1089)
- Applied Analytics (Portland) (p. 1090)
- Biopharmaceutical Regulatory Affairs (Boston) (p. 1090)
- Cloud Computing Application and Management (Boston) (p. 1091)
- Collegiate Athletics Administration (Boston) (p. 1091)
- Construction Management (Boston) (p. 1092)
- Cross-Cultural Communication (Boston) (p. 1092)
- Digital Media Management (Boston) (p. 1093)
- Digital Video (Boston) (p. 1093)
- eSports (Boston) (p. 1094)
- Experiential Teaching and Learning (Boston) (p. 1094)
- Financial Markets and Institutions (Boston) (p. 1095)
- Forensic Accounting (Boston) (p. 1095)
- Fundraising and Development (Boston) (p. 1096)
- Game Design (Boston) (p. 1096)
- Geographic Information Systems (Boston) (p. 1097)
- Global Studies and International Relations (Boston) (p. 1097)
- Higher Education Administration (Boston) (p. 1098)
- Human-Centered Informatics (Boston) (p. 1099)
- Human Resources Management (Boston) (p. 1099)
- Information Security Management (Boston) (p. 1100)
- Insurance Analytics and Management (Boston) (p. 1101)
- Interactive Design (Boston) (p. 1101)
- International Biopharmaceutical Regulatory Affairs (Boston) (p. 1102)
- Leadership (Boston) (p. 1102)
- Leading and Managing Technical Projects (Boston) (p. 1103)
- Learning Experience Design and Technology (Boston) (p. 1104)
- Medical Device Regulatory Affairs (Boston) (p. 1105)
- Nonclinical Biomedical Product Regulation (Boston) (p. 1105)
- Nonprofit Management (Boston) (p. 1106)
- Organizational Communication (Boston) (p. 1107)
- Professional Sports Administration (Boston) (p. 1107)
- Project Business Analysis (Boston) (p. 1108)
- Project Management (Boston) (p. 1108)
- Project Management (Portland) (p. 1109)
- Public and Media Relations (Boston) (p. 1110)
- Quality Assurance Compliance (Boston) (p. 1111)
- Remote Sensing (Boston) (p. 1111)
- Social Media for Organizational Performance (Boston)
- Usability (Boston) (p. 1112)

3D Animation, Graduate Certificate (Boston)

3D animation is not only a major component in the film and broadcast industries, it is also a crucial element in online entertainment and a driving force for the gaming industry. Companies use animation in advertisements, websites, and training programs. The growing use of gaming technologies in education and industry (often referred to as serious games) has given rise to a need for skilled animators who can work closely with business and academic institutions.

The Graduate Certificate in 3D Animation offers a practice-oriented approach to the art and science of animation, with a particular emphasis on the special requirements of 3D modeling and animating for the gaming industry. Course work is designed to develop students' powers of visualization as well as provide a conceptual basis for visual narrative. The program seeks to produce graduates who are skilled in the use of industry-standard animation applications; understand visual principles of lighting, modeling, and surfacing; and are conversant with motion and special effects compositing.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
DGM 6450	Animation Basics	4
DGM 6510	3D Modeling	4
DGM 6530	Character Animation	4

Elective Courses

Code	Title	Hours
Complete a minimum of four quarter hours from the following:		4
DGM 6515	Introduction to After Effects	
DGM 6535	Rigging Principles and Techniques	
DGM 6540	Compositing	

Program Credit/GPA Requirements

16 quarter hours required

Minimum 3.000 GPA required

Agile Project Management, Graduate Certificate (Boston)

Northeastern University's graduate certificate in agile is designed to empower students to explore agile principles and practice and remain up-to-date with current trends in the agile framework. The increasingly important role of agile practitioners and managers is becoming clear as agile business development processes are being adopted by major companies because of its high degree of success in achieving improved time to market, reducing costs, and increasing overall customer satisfaction.

The graduate certificate in agile is led by highly credentialed faculty members that are agile practitioners with decades of experience in helping companies successfully implement agile in their organizations.

Through courses you take online, our agile graduate certificate project management curriculum will give you the opportunity to:

- Develop a strong framework and understanding of the role of agile management
- Develop an understanding of the agile management processes and methodologies
- Develop an understanding of how an agile approach to managing projects can deliver value to the organization
- Develop a personal leadership strategy for success as an agile practitioner
- Develop an agile evaluation plan to measure success

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management ¹	4
PJM 6810	Principles of Agile Project Management	3
PJM 6815	Advanced Agile Project Management	3

PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3

- ¹ Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks and is recommended for students who do not have a basic working knowledge of Microsoft Project software. Students who do not complete Foundations of Project Management (PJM 5900) take project management elective credits to satisfy the required credits for the program.

Elective Courses

Code	Title	Hours
INT 6940	Experiential Learning Projects for Professionals	1-4
INT 6943	Integrative Experiential Learning	3
PJM 6075	Project Finance	3
PJM 6125	Project Evaluation and Assessment	3
PJM 6140	Managing Troubled Projects	3
PJM 6145	Global Project Management	3
PJM 6175	Project Resource Management	3
PJM 6180	Project Stakeholder Management	3
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6710	Introduction to Program and Portfolio Management	3
PJM 6983	Special Topics	1-4

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Applied Analytics, Graduate Certificate (Boston)

In a global environment characterized by digital transformation, rapid change, and high levels of uncertainty, the ability to hire, reskill, and upskill analytic talent is a major driver of organizational performance. The Graduate Certificate in Applied Analytics in the College of Professional Studies is designed to prepare students to develop analytical skills that will support decision making in an organization's strategy. The certification focuses on data discipline: navigating the sea of information that's generated by machines; technical ability: understanding how machines function and how to interact with them; and the human discipline: what humans can do that machines, for the foreseeable future, cannot emulate—all with an emphasis on experiential learning. Students also will have the opportunity to tailor their studies to support their specific career objectives.

To address the needs of students who are currently in an analytical role, as well as those who are new to the field, the certification curriculum incorporates a broad menu of course options and a pathway through the program based on a student's experience level, as well as concentrations that are aligned with student career objectives.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Core Courses

Code	Title	Hours
Required Courses		
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Electives		
Complete two of the following:		6
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

Applied Analytics, Graduate Certificate (Portland)

In a global environment characterized by digital transformation, rapid change, and high levels of uncertainty, the ability to hire, reskill, and upskill analytic talent is a major driver of organizational performance. The Graduate Certificate in Applied Analytics in the College of Professional Studies is designed to prepare students to develop analytical skills to support decision making in an organization's strategy. The certificate curriculum focuses on data discipline, navigating the sea of information that is generated by machines; technical ability, understanding how machines function and how to interact with them; and the human discipline, what humans can do that machines, for the foreseeable future, cannot emulate. The program emphasizes experiential learning.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
Required Core Courses		
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Electives		
Complete two of the following:		6
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

Biopharmaceutical Regulatory Affairs, Graduate Certificate (Boston)

The biotechnology and pharmaceutical industries continue to experience rapid growth in the U.S. market. As companies in these industries seek approval to market their products in the United States, demand for qualified regulatory affairs professionals continues to increase. Product development scientists, marketers, quality personnel, as well as legal experts that guide companies through the Food and Drug Administration (FDA) approval process, will benefit from regulatory affairs training.

The Graduate Certificate in Biopharmaceutical Regulatory Affairs is designed to provide students with a greater understanding of U.S. biologic and pharmaceutical product regulation and their unique development, marketing, manufacturing, and postmarket approval-related issues. The program also seeks to prepare students to ensure regulatory compliance, proper validation, and utilization of proper quantitative measurement techniques. Courses from this certificate may be applied toward the Master of Science in Regulatory Affairs for Drugs, Biologics, and Medical Devices.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6380	Advanced Regulatory Writing: New Drug Applications	4
Complete one of the following:		4
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6235	Emerging Product Categories in the Regulation of Drugs and Biologics	

Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

Cloud Computing Application and Management, Graduate Certificate (Boston)

Cloud computing is the delivery of computing services over the internet. Due to the relatively lower cost of IT solutions, many organizations have started to take advantage of cloud services provided by Amazon Web Services, Microsoft Azure, IBM Cloud and SoftLayer, Google Cloud Platform, Salesforce, and so on. These web service providers offer a broad range of global cloud-based IT products, including computing technologies, storage, databases, analytics, networking, mobile, developer tools, management tools, Internet of Things connectivity, and security and enterprise applications. These services can help organizations move faster, facilitate agile development, and better manage scalability.

The cloud computing application and management (CCA&M) graduate certificate offers students an opportunity to develop technical and management skills to address the needs of enterprise IT services. They study theoretical and practical aspects of distributed systems from both technical and business perspectives. Successful students will be able to identify frameworks, techniques, and existing IT solutions to manage internet services at different levels (infrastructure, platform, and software) and will also be able to demonstrate the ability to use APIs to integrate applications and business operations into the cloud. They can be directly employed by web service providers or instead work as IT solutions managers in organizations that contract with web service providers.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ITC 6420	Introduction to Cloud Computing Applications and Management	3
ITC 6450	Advanced Cloud Computing Applications and Management	3
ITC 6015	Enterprise Information Architecture	3
ITC 6460	Cloud Analytics	3
ITC 6520	Network Protection and Cloud Security	3
Complete one of the following:		3-4
ITC 6355	Web Application Design and Development	
ITC 6470		
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	

Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

Collegiate Athletics Administration, Graduate Certificate (Boston)

College athletics in the United States is comprised of more than 1,200 schools, conferences, and organizations that collectively invest in the well-being of student-athletes—both on and off the field.

The Graduate Certificate in Collegiate Athletics Administration offers students an opportunity to obtain an in-depth understanding of the largest amateur segment of the sports industry. Through the program's curriculum, students will be given the opportunity to acquire leadership skills and knowledge in a variety of collegiate athletics topics including sports management, NCAA compliance, fund-raising, academic advising, gender and diversity in sport, and Title IX legislation.

Credits earned in this certificate may be used to satisfy some of the degree requirements Master of Sports Leadership (p. 1085) program. For further information see the Seeking More Than One Certificate or Degree (p. 993) page.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LDR 6427	Gender and Diversity in Sport	3
LDR 6442	Athletic Fund-Raising	3
LDR 6455	NCAA Compliance	3
LDR 6465	Title IX	3

LDR 6470	Bystander Strategies for the Prevention of Gender-Based Violence	3
LDR 6615	Academic Advising for Student-Athletes	3

Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

Construction Management, Graduate Certificate (Boston)

Over the last two decades, construction in both the public and private sector has become increasingly complex, requiring construction and project managers to have a stronger skill base to be successful in acquiring and executing projects.

The Graduate Certificate in Construction Management is intended to serve owners' representatives, consulting engineers, architects, design engineers, contractors, and subcontractors. Individuals who have a bachelor's degree, but not necessarily in construction, and who have been identified by their companies as having high potential for advancement are also good candidates for this program.

Courses from this certificate may be applied toward the Master of Science in Project Management.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CMG 6400	Introduction to Construction Management	4
CMG 6402	Alternative Project Delivery Methods and Project Controls	4
CMG 6403	Safety, Project Risk, and Quality Management	4
CMG 6405	Construction Law	4

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Cross-Cultural Communication, Graduate Certificate (Boston)

The Graduate Certificate in Cross-Cultural Communication will help to equip professionals with the knowledge and competencies to:

- Analyze personal cross-cultural awareness and implicit bias, in addition to interpret organizational cross-cultural communication strategy to develop effective communication processes and activities
- Evaluate communication audiences from a holistic perspective, thereby constructing effective verbal and nonverbal interactions based on cross-cultural consumption
- Formulate enlightened cross-cultural communication and inclusive diversity strategies, processes, and policies
- Demonstrate critical thinking skills through research, case analysis, role-plays, and experiential learning demonstrating agility, quick response, and diplomacy employing cross-cultural communication strategies

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	3
CMN 6095	Foundations of Developing Cultural Awareness	3

Elective Courses

Code	Title	Hours
Choose from the following:		10
CMN 6096	Cultural Communications Lab	
GST 6100	Globalization and Global Politics and Economics	
GST 6101	Global Literacy, Culture, and Community	
HRM 6070	Global Human Resources Management	

INT 6900	International Field Study Experience
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility
LDR 6145	Developing Sustainable Global Leadership
NPM 6230	Measuring Social Impact
PBR 6100	Introduction to Public Relations

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Digital Media Management, Graduate Certificate (Boston)

The digital media market space can present unexpected challenges to standard business models. The Graduate Certificate in Digital Media Management offers courses designed to help managers apply best business practices to these nontraditional challenges. Students are offered the opportunity to gain skills in managing functionally diverse digital media teams, responding effectively to response-critical projects, and implementing marketing strategy in a variety of media channels.

Courses in the program were selected by faculty from the College of Professional Studies' Master of Professional Studies in Digital Media. The certificate consists of courses selected from the MPS in Digital Media (p. 1035) curriculum.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
DGM 6279	Project Management for Digital Media	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4
Complete one of the following:		4
DGM 6230	Digital Media Entrepreneurship	
DGM 6290	Social Media and Brand Strategy Implementation	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Digital Video, Graduate Certificate (Boston)

With the quality and ease of use of digital video camcorders, anyone can capture moving images, but the result is like a Stradivarius violin: It takes training to make music. The Graduate Certificate in Digital Video is a hands-on introduction to digital video technologies, as well as an examination of the social, cultural, and political implications of moving-image production in the digital age. Students have an opportunity to gain competency in digital production and postproduction while exploring various formal, conceptual, and structural strategies. Students will also have an opportunity to learn to generate digital video that communicates effectively and inventively, in preparation for positions in the creative industries of gaming, design, and media production.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
DGM 6435	Digital Video Production	4
DGM 6440	Editing in the Digital Studio	4
DGM 6506	Introduction to Digital Video	2
DGM 6540	Compositing	4
Complete one of the following:		2
DGM 6515	Introduction to After Effects	
DGM 6516	Virtual and Augmented Reality (VR/AR)	

Elective

Code	Title	Hours
Complete one of the following:		4
DGM 6520	Lighting for the Camera	
DGM 6545	Documentary and Nonfiction Production	

Program Credit/GPA Requirements

20 total quarter hours required

Minimum 3.000 GPA required

eSports, Graduate Certificate (Boston)**Overview**

Students will have the opportunity to take specialized courses that focus on the emerging eSports field. The certificate is designed for professionals in sports leadership careers who want to have a deeper understanding of eSports. It also provides a pathway to prepare sports and gaming enthusiasts with a combination of coursework across graduate programs to confidently enter this emerging sports sector. This is in keeping with the commitment to serve diverse students who may want to explore a nontraditional learning path as they consider a new career or wish to continue career development in synch with changes occurring in the profession around them.

Credits earned in this certificate may be used to satisfy some of the degree requirements of the Master of Sports Leadership program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CMN 6040	Consumer Behaviors in the Online Environment	3
DGM 6400	Game Design Fundamentals	4
DGM 6516	Virtual and Augmented Reality (VR/AR)	2
LDR 6323	Event Management	3
LDR 6445	Corporate Sponsorships	3
LDR 6480	The Business of eSports	3

Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

Experiential Teaching and Learning, Graduate Certificate (Boston)

Experiential learning has been documented to be an effective pedagogy for promoting deeper learning, fostering student engagement, and ultimately closing the opportunity gap for underserved students. However, many educators and educational leaders are not familiar with best-practice strategies for leading, practicing, and researching experiential learning in their classrooms and therefore need themselves to become adult learners to begin the process of pedagogical transformation.

The Graduate Certificate in Experiential Teaching and Learning is designed to provide K–12 experiential educators with the knowledge, skills, and attitudes needed to design, facilitate, research, and lead engaging and meaningful learning experiences. The program explores the theoretical foundations, approaches, and strategies for learning through experience and how to apply these competencies with a commitment toward fostering educational equity.

Classroom teachers who are interested in transforming their practice as well as educators who are interested in seeking out leadership roles within schools will benefit from earning the Graduate Certificate in Experiential Teaching and Learning as the certificate covers content and skills needed for leading both student and adult experiential learning.

The certificate is comprised of 16 quarter hours, which may be applied toward the Master of Education in Learning and Instruction.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
EDU 6001	Experiential Learning Theory and Practice	4
EDU 6002	Culturally Responsive Experiential Teaching and Learning	4
EDU 6003	Applied Research in Experiential Teaching and Learning	4
EDU 6004	Leading Experiential Teaching and Learning	4

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Financial Markets and Institutions, Graduate Certificate (Boston)

In this rapidly changing business environment, the barriers between institutions are eroding, and competition is increasing due to deregulation and new product development. Managing internal operations more efficiently and adapting to the changing external environment is critical to the long-term survival of institutions. The Graduate Certificate in Financial Markets and Institutions seeks to prepare students to measure the impact of accounting decisions on performance; to manage risks, assets, and liabilities to meet corporate goals; to understand domestic and international financial systems and the institutions within them; and to build financial relationships that foster marketing financial products.

An examination of financial services industry principles and practices seeks to provide individuals working in brokerage houses, investment or commercial banks, insurance companies, or real estate with a greater understanding of financial systems as well as how to manage risks, assets, and liabilities in meeting corporate goals.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
FIN 6101	Accounting Fundamentals for Financial Institutions	3
FIN 6102	Asset and Liability Management	3
FIN 6120	Building Financial Relationships	3
FIN 6161	Investment Analysis	3
Complete four quarter hours of the course below:		
CED 6995	Project	4

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Forensic Accounting, Graduate Certificate (Boston)

News surrounding corporate corruption has had a significant impact on businesses, particularly the accounting industry. In response, the government has enacted sweeping accounting and business laws such as the Sarbanes-Oxley 2002 legislation. Additionally, many professional organizations, including the American Institute of Certified Public Accountants (AICPA) and the Association of Certified Fraud Examiners (ACFE), have made the prevention, detection, and prosecution of fraud and accounting abuse a priority.

This **four-course graduate certificate in forensic accounting** is designed to help students apply techniques in identifying, collecting, and examining evidence, including how to identify financial statement misrepresentation, transaction reconstruction, and tax evasion.

Note: Courses from this certificate may not be applied toward the Master of Science in Leadership.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Courses should be taken in the following sequence:

Code	Title	Hours
ACC 6210	Forensic Accounting Principles	3
ACC 6220	Dissecting Financial Statements	3

1096 Fundraising and Development, Graduate Certificate (Boston)

ACC 6230	Investigative Accounting and Fraud Examination	3
ACC 6240	Litigation Support	3
Complete the following course for four quarter hours:		4
CED 6995	Project	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Fundraising and Development, Graduate Certificate (Boston)

This Graduate Certificate in Fundraising and Development is designed to prepare students for a career in fundraising and development roles, or provide a transition for a more comprehensive curriculum within the Master of Science in Nonprofit Management. The certificate seeks to provide expert-level skills to students who want to gain experience with the fundraising and development fields using current industry tools and techniques through a student-centered curriculum. Courses are designed to provide a solid foundation of knowledge on fundraising and development, which are areas in the nonprofit field experiencing growth and increased career opportunities.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
NPM 6130	Fundraising and Development for Organizations	3
NPM 6140	Grant and Report Writing	3
NPM 6220	Donor Research and Management	3
NPM 6230	Measuring Social Impact	3
NPM 6240	Managing the Annual Fund	3

Elective Courses

Code	Title	Hours
Choose from the following:		1
CMN 6096	Cultural Communications Lab	
INT 6940	Experiential Learning Projects for Professionals	
INT 6000	Writing Lab	
NPM 6100	Strategic Management and Leadership for Nonprofit Organizations	
NPM 6210	Social Value Investing and Effective Partnerships	
NPM 6995	Project	
PBR 6001	Communications Technology Lab	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Game Design, Graduate Certificate (Boston)

Game design is one of the fastest-growing fields in entertainment, business, and education. From healthcare to political science, companies use games to educate their constituents and enhance employee skills.

The Graduate Certificate in Game Design offers a practice-oriented approach to the art and science of game making. The program emphasizes visual design and programming for video games and fosters conceptual understanding of the principles of game design for all varieties of games—from educational board games to iPhone games.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
DGM 6308	Intermediate Programming for Digital Media	4
DGM 6400	Game Design Fundamentals	4
DGM 6403	Game Engine Fundamentals	4
DGM 6405	Game Development	4
DGM 6410	Game Design Technology Lab	4

Program Credit/GPA Requirements

20 total quarter hours required

Minimum 3.000 GPA required

Geographic Information Systems, Graduate Certificate (Boston)

A geographic information system (GIS) combines layers of data to give needed information on specific locations. Such a system can map environmental sensitivities or geological features or can report on how best to speed emergency personnel to an accident or crime scene. Current fields using GIS include healthcare, public safety, environmental management, transportation and operations technology, real estate, and public utilities.

The Graduate Certificate in Geographic Information Systems program offers hands-on training, seeking to give students the necessary skills and understanding to apply GIS competently and effectively. As a result of the certificate curriculum, students should be well versed in GIS theory, have practical hands-on exposure to GIS software and hardware, understand the representation of data in both mapped and tabular forms, and know how to plan and construct spatial databases.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
GIS 5103	Foundations of Geographic Information Science	4
RMS 5105	Fundamentals of Remote Sensing	3
GIS 5201	Advanced Spatial Analysis	3

Electives

Code	Title	Hours
Complete two of the following:		6
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	
GIS 6320	Use and Applications of Free and Open-Source GIS Desktop Software	
GIS 6340	GIS Customization	
GIS 6345	Geospatial Programming	
GIS 6350	Planning a GIS Implementation	
GIS 6360	Spatial Databases	
GIS 6370	Internet-Based GIS	
GIS 6385		
GIS 6983	Topics	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Global Studies and International Relations, Graduate Certificate (Boston)

The Graduate Certificate in Global Studies and International Relations is designed to provide students with the skills and training necessary to analyze, research, and evaluate a topic of interest in a global location. Overall, the program curriculum focuses on the themes of transition and development in the global world. Core courses provide a base of knowledge about global issues and are combined with an elective that allows students to focus on a specific area of interest.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
GST 6100	Globalization and Global Politics and Economics	4
GST 6101	Global Literacy, Culture, and Community	4
GST 6320	Peace and Conflict	4

Elective

Code	Title	Hours
Complete one of the following:		4
GST 6501	Regional Studies: East Asia	
GST 6502	Regional Studies: Middle East and North Africa	
GST 6503	Regional Studies: Sub-Saharan Africa	
GST 6504	Regional Studies: Europe and Eurasia	
GST 6505	Regional Studies: Southwest and Central Asia	
GST 6506	Regional Studies: Latin America	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Higher Education Administration, Graduate Certificate (Boston)

Institutions of higher education around the world are facing considerable pressures that range from changing demographics to financial strain amid disruptions unimaginable 20 years ago. Administrators must develop foundational skills to create conditions that allow their students and institutions to thrive in a constantly changing world. The Graduate Certificate in Higher Education Administration is designed to prepare practitioners for the unique and difficult challenges facing the next generation of higher education professionals. This program allows students the flexibility to build upon their skills in a customized manner with a focus on practical skills and course designs firmly grounded in experiential learning.

The Graduate Certificate in Higher Education Administration program seeks to prepare students with the knowledge to understand the structure, governance, and operation of various higher education organizations. Within the context of classes, students have an opportunity to develop solutions to real-world problems.

Unique Features

- The ability to complete the program 100 percent while accessing and contributing to an extensive professional network—critical in the world of higher education.
- Northeastern faculty who are currently meaningfully engaged in the field, bringing their practical expertise to our students.
- The integration of experiential projects within several courses allowing students to develop practical skills.
- Credits can be applied toward the Master of Education, Higher Education Administration (p. 1014) program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Core Courses

Code	Title	Hours
EDU 6202	Faculty, Curriculum, and Academic Community	4
EDU 6205	The Demographics of the New College Student	4
EDU 6219	Higher Education Law and Policy	4

Elective

Code	Title	Hours
Complete one of the following:		4
EDU 6217	The History of Colleges and Universities	
EDU 6218	Money Matters: Financial Management in Higher Education	

EDU 6224

Strategic Leadership in Enrollment Management

EDU 6234

Program Evaluation, Assessment, and Accreditation in Higher Education

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Human-Centered Informatics, Graduate Certificate (Boston)

Human-centered informatics (HCI) focuses on the design, development, and evaluation of IT systems with a particular emphasis on the relations and interactions between people and IT systems. The emphasis of understanding users experience when they interact with technology in the information-rich environment and the design of interfaces between users and systems makes it different from the focus of software engineering programs or visual and artistic design programs.

The human-centered informatics graduate certificate offers students the opportunity to learn the theories of cognitive and social psychology as well as universal principles of design adopted in human-computer interaction. Students develop the technical skills to study user experience in various IT environments (home, business, social media, healthcare, etc.), focusing on user needs, information architecture, and design of user interfaces. Successful students that graduate with the HCI graduate certificate will be able to propose innovative or improve design solutions to real-world problems.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	3
DGM 6461	Interactive Information Design 1	4
DGM 6168	Usability and Human Interaction	4
DGM 6268	Usable Design for Mobile Digital Media	4
Elective		
Complete one of the following:		3-4
DGM 6463	Interactive Information Design 2	
ALY 6070	Communication and Visualization for Data Analytics	
ITC 6355	Web Application Design and Development	

Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

Human Resources Management, Graduate Certificate (Boston)

In today's multifaceted organizations, human resource professionals must respond to the growing challenges of regulatory compliance, complex benefit plans, and training and motivating employees.

The Graduate Certificate in Human Resources Management seeks to foster a deep understanding of organizational development and effective change management, workforce planning and strategic recruitment, and training and performance management.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
HRM 6015	Introduction to Human Resources Management ¹	3
HRM 6025	Workforce Analytics	3
HRM 6042	Strategic Workforce Planning	3

¹ This course is for students with less than two years of human resources experience. Students who do not complete this course take electives to satisfy required program credits.

Electives

Code	Title	Hours
Complete seven quarters hours of the following:		7
CMN 6096	Cultural Communications Lab	
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6035	Digital Human Resources Platforms	
HRM 6047	Managing the Employee Life Cycle	
HRM 6050		
HRM 6060	Organizational Design	
HRM 6070	Global Human Resources Management	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Information Security Management, Graduate Certificate (Boston)

Information security is a management issue with global business implications. To succeed in today's network economy requires more than simply a focus on information technology (IT) issues. Succeeding also requires a focus on security strategy and management. IT security governance is an overarching consideration in all risk-assessment and management-related endeavors and is important for information security since many issues have legal, regulatory, policy, and ethical considerations. The associated risks of business today must be clearly understood and managed.

The Graduate Certificate in Information Security Management is designed to provide a conceptual and practical overview of information security management. It begins with an overview of key information security management issues and principles. It presents security governance challenges including the policy, law, regulatory, and ethical accountability frameworks that information security risk managers must work within. The program includes review courses that prepare students for the Certified Information Systems Security Professional (CISSP) and Certified Information Systems Auditor (CISA) exams.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ITC 6010	Information Technology Strategy and Governance	3
ITC 6300	Foundations of Information Security	3
ITC 6305	IT Infrastructure (Systems, Networks, Telecom)	3
ITC 6315	Information Security Risk Management	3
ITC 6520	Network Protection and Cloud Security	3

Electives

Code	Title	Hours
Complete one of the following:		3
ITC 6330	CISSP Preparation	
ITC 6530	Security Analytics	

Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

Insurance Analytics and Management, Graduate Certificate (Boston)

Overview

Learners have an opportunity to gain appropriate technical skills, insurance design expertise, and experience needed to assume professional roles in the insurance field. Upon completion, learners should be prepared to:

- Investigate and identify opportunities to address insurance questions and/or challenges in the evolving digital agenda of the insurance industry.
- Articulate and defend the significance and implications of the intersections of application orientation, domain knowledge, digital leadership and human-centered design, decision support, and digital transformation across the insurance enterprise.
- Integrate the principles, tools, and methods of digital transformation and human-centered design to solve organizational problems by making informed decisions related to the design and deployment of systems in human environments and workflows within the organization.
- Develop a formally proposed solution and/or application, real or hypothetical, to address an insurance-related question and/or challenge.
- Apply data management and strategic analysis, problem-solving, decision-making, effective visualization/communication, and digital leadership skills to the application or deployment of technologies and products in a real-world scenario.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
Core Courses		
INS 6020	Claims Management	3
INS 6030	Insurance Underwriting	3
INS 6040	Introduction to Insurance Data Analytics	3
INS 6050	Intermediate Insurance Analytics	3
Electives		
Complete two of the following:		6
ALY 6070	Communication and Visualization for Data Analytics	
EAI 6000	Fundamentals of Artificial Intelligence	
EAI 6020	AI System Technologies	
INS 6120	Macro Challenges in Insurance	
INS 6140	Distribution and Sales	
INS 6983	Special Topics	

Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

Interactive Design, Graduate Certificate (Boston)

Digital media plays an increasingly significant role in the global culture and economy. The Graduate Certificate in Interactive Design offers an overview of courses in the creative process of storytelling and communicating through visuals and sound. Students have an opportunity to gain expertise in time-based design and interface and experience design through a practice-oriented problem-solving approach.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
DGM 6217	Typography for Interactivity	4
DGM 6317	Screen-Based Publication Design	4
DGM 6461	Interactive Information Design 1	4

Elective Courses

Code	Title	Hours
Choose from the following:		4
DGM 6463	Interactive Information Design 2	
DGM 6471	Designing Infographics	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

International Biopharmaceutical Regulatory Affairs, Graduate Certificate (Boston)

To work in today's global biopharmaceutical industry, there is a strong need to understand international regulations that impact the development, marketing, and manufacturing of pharmaceutical and biotechnology products.

The Graduate Certificate in Biopharmaceutical International Regulatory Affairs curriculum focuses on factors that facilitate the safety, performance, and efficacy of biomedical goods. Program training covers the assessment of international regulations and interpretation of their likely impact on a company's global commercialization strategies. Through participation in the program, students will have an opportunity to gain an understanding of international regulatory requirements necessary to implement such strategies.

Course work covers biotechnology and pharmaceutical product approval processes, regulatory analysis, and liability laws as they exist across different regulatory systems. The graduate certificate will provide core regulatory knowledge to students entering into the field from bench research, clinical studies, quality control/assurance, pharmacy, bioengineering, business, and legal analysis. The curriculum covers regulatory environments in Europe, Latin America, Australia, Japan, and other emerging economies. Courses from this certificate may be applied toward the Master of Science in Regulatory Affairs for Drugs, Biologics, and Medical Devices.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
RGA 6221	European Union Compliance Process and Regulatory Affairs	4
Complete a minimum of 12 quarter hours from the following:		12
RGA 6204	Legal Issues in International Food, Drug, and Medical Device Regulation	
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	
RGA 6212	Introduction to Safety Sciences	
RGA 6223	Introduction to Australian, Asian, and Latin American Regulatory Affairs	
RGA 6224	Regulation of Biomedical Product Commercialization by Health Canada	
RGA 6244	Therapeutic Product Development in Canada	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Leadership, Graduate Certificate (Boston)

Today's cross-functional teams and organizations require a leadership style that capitalizes on the collective expertise and capabilities of the group. The development and mastery of collaborative leadership skills are not typically part of one's focused discipline preparation; hence, leadership requires deliberate development by those who assume leadership roles.

The Graduate Certificate in Leadership starts with the premise that everyone is capable of leadership. The program studies every aspect of leadership dynamics from the leader as an individual to working in teams and from the organization itself to the development of strategic leadership techniques. Course work exposes participants to a series of alternative perspectives of leadership, including collaborative models. Using the course's action-learning methods, participants build a personal model of leadership that they can put to immediate use in their workplace.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6140	Leadership Strategy, Design, and Practice	3

Leadership Electives

Code	Title	Hours
Complete two of the following:		6
LDR 6135	Ethical Leadership	
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
LDR 6150	Innovation and Organizational Transformation	
CMN 6010	Strategic Communication Management	

Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

Leading and Managing Technical Projects, Graduate Certificate (Boston)

Whether you're an established project manager, or you're working in a technical field and aspire to be one, Northeastern's Graduate Certificate in Leading and Managing Technical Projects seeks to give you the foundational skills and practical knowledge you need to be successful.

Through courses you take online, our technical project management curriculum will give you the opportunity to:

- Develop the leadership and management skills to lead technical projects
- Learn how to communicate technical content to a nontechnical audience
- Gain practice leading remote teams, including global teams
- Plan and schedule projects using the most current and relevant methodologies
- Develop a personal leadership approach to motivate and inspire others

Credits earned in this certificate may be used to satisfy some of the degree requirements of a College of Professional Studies master's program. For further information, see the Seeking More Than One Certificate or Degree page.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management ¹	4
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3

¹ Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks and is recommended for students who do not have a basic working knowledge of Microsoft Project software. Students who do not complete Foundations of Project Management (PJM 5900) take project management electives to satisfy required program credits.

Elective Courses

Code	Title	Hours
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	

PJM 6145	Global Project Management
PJM 6175	Project Resource Management
PJM 6180	Project Stakeholder Management
PJM 6205	Leading and Managing Technical Projects
PJM 6210	Communication Skills for Project Managers
PJM 6215	Leading Remote Project Teams
PJM 6710	Introduction to Program and Portfolio Management
PJM 6983	Special Topics

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Learning Experience Design and Technology, Graduate Certificate (Boston)

The Graduate Certificate in Learning Experience Design and Technology offers a practice-based exploration of the key skills required in the rapidly expanding field of learning design. Never before has the need for professionals with LXD expertise been so essential across all industry sectors. The certificate is designed to meet this need by grounding designers, educators, technologists, and other professionals in the art and science of effective learning design. Students will have the opportunity to build or strengthen design and technological skills that can be applied across PK–12, higher education, government, military, corporate, and nonprofit environments. Skills can be applied to learners of all ages and in online, mobile, virtual, face-to-face, and blended formats.

The program's innovative approach blends academic and workplace-based learning with a focus on how people learn, foundational learning design skills, and advanced learning design topics. Experiential opportunities are built into each course. Students will have the opportunity to develop an online portfolio of work to demonstrate their capacity to think strategically; put creative ideas into action using a variety of technologies; learning design environments that meet academic, personal, professional, and organizational goals; and interpret and clearly communicate results to stakeholders. Credits earned in this certificate may be used to satisfy some of the degree requirements of the Master of Professional Studies in Learning Experience Design and Technology program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
Core Requirements		
EDU 6319	How People Learn	4
EDU 6334	Foundations of Learning Experience Design	4
EDU 6335	Advanced Practices in Learning Experience Design	4

Electives

Code	Title	Hours
Complete a minimum of 4 quarter hours from the list below to reach the program credits required		4
CMN 6080	Intercultural Communication	
DGM 6501	Web Creation Boot Camp	
EDU 5978		
EDU 6001	Experiential Learning Theory and Practice	
EDU 6002	Culturally Responsive Experiential Teaching and Learning	
EDU 6003	Applied Research in Experiential Teaching and Learning	
EDU 6004	Leading Experiential Teaching and Learning	
EDU 6202	Faculty, Curriculum, and Academic Community	
EDU 6323	Digital Learning Tools and Technologies for LXD	
EDU 6329	Connecting Theory and Practice	
EDU 6331	E-Learning Design as a Collaborative Profession	
EDU 6332	Open Learning	
EDU 6336	Data Literacy for Data-Driven Decision Making	
EDU 6338	Learning Experience Design Studio	
EDU 6558	Issues in Education	

NPM 6140

Grant and Report Writing

PJM 5900

Foundations of Project Management

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Medical Device Regulatory Affairs, Graduate Certificate (Boston)

The national and regional medical device industries have continued to experience significant market growth, despite the fluctuations in the overall global economy. There are more than 7,000 medical device companies in the United States alone, and nearly 1,000 of these are based in Massachusetts. In total, the medical device sector in Massachusetts employs 36,000 workers, has a payroll of over \$1.8 billion, and annual product shipments of \$7.3 billion.

The Graduate Certificate in Medical Device Regulatory Affairs provides students with an opportunity to gain a detailed knowledge of the regulations influencing the commercialization of new and existing medical devices. The intensely practical curriculum spans the entire life cycle of product development and introduces students to the salient features governing both pre- and postapproval stages. The program content also examines the relationship between regulatory agencies and the medical device industry. Students have the opportunity to take specialized courses on regulatory systems outside the United States.

The certificate will help advance the careers of students coming from such fields as bioengineering, quality control/assurance, intellectual property, business, and marketing. The choice of several courses makes this certificate ideal for students already working in the regulatory world as well as those just entering into the profession.

Courses from this certificate may be applied toward the Master of Science in Regulatory Affairs.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirement

Code	Title	Hours
Required Courses		
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	2
RGA 6202	Medical Device Development: A Regulatory Overview	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
Electives		
Choose from the following:		6
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6222	European Medical Device Regulations	
RGA 6243	Medical Device Product Development in Canada	
RGA 6275	Product Development and Process Validation	
RGA 6370	Advanced Regulatory Writing: Medical Device Submissions	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Nonclinical Biomedical Product Regulation, Graduate Certificate (Boston)

The professional practice of nonclinical regulatory affairs involves understanding, developing, and applying global compliance standards to the biomedical product commercialization process in several cross-functional areas that are separate and distinct from direct clinical patient care. This includes, but is not limited to, design and preclinical development processes, including *in vitro* and *in vivo* animal testing, *in silico* testing, small-scale/large-scale manufacturing process development and validation, development and maintenance of supply chains, as well as product handling and distribution. The Graduate Certificate in Nonclinical Biomedical Product Regulation introduces students to the practice of understanding, developing, and effectively applying global nonclinical compliance standards to new healthcare technologies. Students in the certificate program have the opportunity to:

- Differentiate between the nonclinical vs. clinical aspects of the global biomedical product commercialization process from a regulatory compliance perspective

- Explain the compliance-associated requirements needed to successfully practice professional nonclinical work within the global biomedical products industry
- Describe the nonclinical regulatory standards utilized by the United States Food and Drug Administration (FDA) and other global regulatory agencies to evaluate the safety and efficacy of new and existing biomedical products employed by healthcare practitioners in various patient settings
- Apply fundamental global nonclinical regulations to the biomedical product commercialization process, including therapy design, manufacturing process development and validation, cybersecurity, and supply chain risk management

Students that successfully complete this certificate may apply their courses toward the Master of Science in Regulatory Affairs (p. 1081).

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization	4
RGA 6420	Global IVD Regulations and Submissions	4

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Nonprofit Management, Graduate Certificate (Boston)

Nonprofits today simply require a higher level of management expertise. Nonprofit managers are required to manage people and programs more efficiently and effectively. The Graduate Certificate in Nonprofit Management focuses on developing skills in organizational management, financial management, fund-raising, grant and report writing, human resources management, and governance.

The program integrates theoretical approaches with practical application to prepare students for positions in either small or large nonprofit organizations. The program targets individuals who work in the nonprofit sector as executive directors, managers, program staff, board members, and volunteers. Students have an opportunity to participate in case studies, individual and group projects, and class discussions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	3
NPM 6120	Financial Management for Nonprofit Organizations	3
NPM 6125	Promoting Nonprofit Organizations	3
NPM 6130	Fundraising and Development for Organizations	3
NPM 6150	Human Resources Management in Nonprofit Organizations	3

Electives

Code	Title	Hours
Choose from the following:		1
CMN 6096	Cultural Communications Lab	
INT 6940	Experiential Learning Projects for Professionals	
INT 6000	Writing Lab	
NPM 6100	Strategic Management and Leadership for Nonprofit Organizations	
NPM 6140	Grant and Report Writing	
NPM 6995	Project	
PBR 6001	Communications Technology Lab	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Organizational Communication, Graduate Certificate (Boston)

The study of organizational communication focuses on the dynamics of communication in complex organizations for the purpose of learning how individuals within such organizations can become effective communicators. Whether the context of such communication is meetings or professional presentations, communicating during a crisis, or intercultural exchanges, the message is consistent: Effective communication is a crucial factor in determining organizational success.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CMN 6010	Strategic Communication Management	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6910	Organizational Communication Assessment	3

Elective Courses

Code	Title	Hours
Choose from the following:		7
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6096	Cultural Communications Lab	
CMN 6100	Communication Networks and Managing Information	
PBR 6001	Communications Technology Lab	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Professional Sports Administration, Graduate Certificate (Boston)

The Graduate Certificate in Professional Sports Administration is designed to give students an in-depth understanding of this professional segment of the sports industry. Through the program's curriculum, students will be given the opportunity to acquire professional leadership skills and knowledge in a variety of topical areas including sports management, marketing, sponsorship, event management, risk management, and finance.

Credits earned in this certificate may be used to satisfy some of the degree requirements of the Master of Sports Leadership (p. 1085) program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
LDR 6323	Event Management	3
LDR 6435	Fiscal Practices in Sports	3
LDR 6440	Sports Marketing and Promotions	3
LDR 6443	Ticket Sales and Strategies	3
LDR 6445	Corporate Sponsorships	3
LDR 6460	Risk Management in Athletics	3

Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

Project Business Analysis, Graduate Certificate (Boston)

At the heart of every project is requirements analysis. It's a critical skill set, leveraged across the spectrum of project work. This program provides practicing project managers with a solid framework and understanding of the process of developing requirements. It also emphasizes the need to engage stakeholders throughout the process to ensure outcomes meet the desired needs of the organization.

This graduate certificate allows you to possess an in-demand skill set. It gives you a better opportunity at finding entry-level positions as a PMO analyst or entry-level business analyst. And it prepares you with the knowledge, skills, and tools needed to create and manage requirements to meet stakeholder needs effectively.

In this program, you will:

- Develop a strong framework and understanding of the role of business analyst
- Understand and analyze the voice of the customer and explore potential solutions for their needs
- Apply tools and techniques to elicit requirements (business requirements, stakeholder requirements)
- Translate the needs of the business into clear, concise, quality requirements (solution requirements, functional and nonfunctional requirements)
- Apply analytical skills in the business analysis process
- Develop a personal leadership strategy for success as a business analyst

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management ¹	4
PJM 6610	Foundations of Project Business Analysis	3
PJM 6620	Strategy Analysis and Needs Assessment	3
PJM 6630	Requirements Analysis and Design	3
PJM 6640	Leadership Strategies for the Business Analyst	3

¹ Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks and is recommended for students who do not have a basic working knowledge of Microsoft Project software. Students who do not complete PJM 5900 may substitute project management electives to satisfy required program hours.

Elective Courses

Code	Title	Hours
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6185	Managing Innovation Projects	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6983	Special Topics	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Project Management, Graduate Certificate (Boston)

Technical and managerial employees at all levels of organizations are being asked to manage small and large projects. Many of these professionals have not been specifically trained to effectively and efficiently manage projects. The task of managing projects has its own body of knowledge. This

program seeks to provide the practical and theoretical knowledge for which the Project Management Institute tests, and it is expected that individuals who successfully complete this program will be capable of fulfilling the education requirements of the Project Management Professional (PMP) certification exam.

This certificate program in project management is designed with sufficient course flexibility to accommodate professionals with various levels of project management experience. Project management principles are applicable to both manufacturing and service industries, including professionals in fields such as software engineering, construction management, and financial services.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management ¹	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3

¹ Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute project management electives to satisfy the required program hours.

Elective Courses

Code	Title	Hours
Choose from the following:		3
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Special Topics	

Program Credit/GPA Requirements

16 quarter hours required

Minimum 3.000 GPA required

Project Management, Graduate Certificate (Portland)

The Graduate Certificate in Project Management is designed to accommodate professionals with various levels of project management experience. Project management principles apply to both manufacturing and service industries, including professionals in fields such as software engineering, construction management, and financial services.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
Required Courses		
PJM 5900	Foundations of Project Management ¹	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
Electives		

Complete 3 QH from the following:

3

INT 6940	Experiential Learning Projects for Professionals
INT 6943	Integrative Experiential Learning
PJM 6075	Project Finance
PJM 6125	Project Evaluation and Assessment
PJM 6140	Managing Troubled Projects
PJM 6145	Global Project Management
PJM 6175	Project Resource Management
PJM 6180	Project Stakeholder Management
PJM 6205	Leading and Managing Technical Projects
PJM 6210	Communication Skills for Project Managers
PJM 6215	Leading Remote Project Teams
PJM 6710	Introduction to Program and Portfolio Management
PJM 6983	Special Topics

¹ Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute project management (PJM) electives to satisfy the required program hours.

Program Credit/GPA Requirements

16 quarter hours required

Minimum 3.000 GPA required

Public and Media Relations, Graduate Certificate (Boston)

There is growing demand for communication professionals with digital media skills and a strategic perspective on brand and reputation management. According to the Bureau of Labor Statistics, employment of public relations specialists and managers will grow by 12 percent and 13 percent, respectively. The Graduate Certificate in Public and Media Relations is designed to prepare communication professionals who focus on external stakeholders for the challenges of a rapidly changing industry. This program focuses on developing strategic communication plans, crafting compelling messages, and performing audience research, while preparing students with the latest skills in digital platforms, tools, and techniques.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PBR 6100	Introduction to Public Relations	3
PBR 6135	Public Relations Strategy and Planning	3
PBR 6710	Research: Understanding External Audiences	3

Elective Courses

Code	Title	Hours
Complete 7 quarter hours from the following:		7
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6050	Crisis Communication	
CMN 6075	Digital Marketing Analytics	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
PBR 6001	Communications Technology Lab	
PBR 6125	Community Relations and Corporate Social Responsibility	
PBR 6130	Public Relations Content Development	
PBR 6140	Advanced Public Relations Content Development	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Quality Assurance Compliance, Graduate Certificate (Boston)

Global regulatory requirements and compliance standards for development, marketing approval, and clinical utilization of new biomedical products continue to evolve rapidly in today's dynamic healthcare environment. The professional practice of quality assurance involves ensuring compliance to appropriate industry-specific regulatory standards throughout a biomedical product's life cycle.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
Complete one of the following:		2
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA	
Complete the following courses:		
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
RGA 6234	Risk Management: Compliance and Processes	4
RGA 6275	Product Development and Process Validation	2
Choose from the following to reach 16 quarter hours:		4
RGA 6221	European Union Compliance Process and Regulatory Affairs	
RGA 6410	Fundamentals of CMC Regulations and Methods	
RFA 6220		

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

Remote Sensing, Graduate Certificate (Boston)

Remote sensing is the measurement of information by a recording device that is not in physical contact with the object being measured. In practice, remote sensing is the utilization at a distance (as from aircraft, space shuttle, spacecraft, satellite, or ship) of any device for gathering information about the environment. The term remote sensing is most often applied to terrestrial and weather observations but can be applied to planetary environments and astronomy. Remote sensing is applicable to many other situations, including land-use change, pollution tracking, land-use and planning, transportation systems, and military observation.

The online Graduate Certificate in Remote Sensing aims to make education and training in remote sensing available to adult and professional students. The remote sensing certificate program seeks to produce students who are well versed in remote sensing theory, who have hands-on exposure to remote sensing software and hardware, and who have learned how to extract pertinent data from remotely sensed data sets. This six-course certificate program seeks to provide students with the necessary skills and understanding to apply remote sensing knowledge competently and effectively in a variety of areas.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Courses

Code	Title	Hours
RMS 5105	Fundamentals of Remote Sensing	3
RMS 6110	Introduction to Machine Learning for Image Data	3

Remote Sensing Electives

Code	Title	Hours
Complete four of the following:		12
GIS 6345	Geospatial Programming	
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	
RMS 6240	Introduction to Radar and LiDAR Remote Sensing	
RMS 6280	Automated Feature Extraction for the Geospatial Professional	

RMS 6290

RMS 6983

Topics

Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

Social Media for Organizational Performance, Graduate Certificate (Boston)

In organizations, social media management and strategy development have become core skills required for communication professionals. According to WANTED Analytics, over 1.6 million working professionals utilize social media skills in jobs at the manager and executive level. The Graduate Certificate in Social Media for Organizational Performance focuses on strategic framework and the role digital media has in supporting organizational performance. The program integrates theory and practice, including experimenting with various tools and platforms and reflecting on lessons learned from active management and experimentation.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
DGM 6285	Interactive Marketing Fundamentals ¹	4
DGM 6290	Social Media and Brand Strategy Implementation	4

Electives

Code	Title	Hours
Complete a minimum of five quarter hours from the following:		5
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6075	Digital Marketing Analytics	
CMN 6096	Cultural Communications Lab	
DGM 6168	Usability and Human Interaction	
DGM 6550	Search Engine Optimization: Strategy and Implementation ²	
PBR 6001	Communications Technology Lab	

Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

¹ Interactive Marketing Fundamentals (DGM 6285) is for students who do not have digital media marketing experience. Students who do not complete this course take additional elective credits to satisfy the required credits for the program. Students may also meet the requirement through prior learning assessment. Visit the Credit for Prior Learning (<https://cps.northeastern.edu/academics/prior-learning-assessments/>) page for more information.

² Contact your advisor to enroll in this course. Students who choose Search Engine Optimization: Strategy and Implementation (DGM 6550) are not required to complete its course prerequisites.

Usability, Graduate Certificate (Boston)

The Graduate Certificate in Usability is a practical, in-demand, career-focused graduate certificate. The certificate stresses both a broad, theory-based introduction to the field, as well as the ability to choose from focused electives, with an emphasis on practical assignments. This certificate highlights the key skills and tools used by usability generalists, working in a broad variety of fields.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
DGM 6168	Usability and Human Interaction	4
DGM 6268	Usable Design for Mobile Digital Media	4
DGM 6461	Interactive Information Design 1	4
DGM 6525	Research Methods for Global User Experiences	4

Electives Courses

Code	Title	Hours
Complete 4 quarter hours from the following:		4
DGM 6308	Intermediate Programming for Digital Media	
DGM 6451	Web Development	
TCC 6110		

Program Credit/GPA Requirements

20 total quarter hours required
Minimum 3.000 GPA required

College of Science

Website (<https://cos.northeastern.edu/admissions/graduate-programs/>)

Brent Nelson, PhD, Interim Dean

Missy McElligott, PhD, Interim Associate Dean for Undergraduate Affairs

Sanjeev Mukerjee, PhD, Senior Associate Dean for the Global University

Carla Mattos, PhD, Associate Dean, PhD Programs and Graduate Affairs

Jeff Agar, PhD, Associate Dean of MS Education and Lifelong Learning

Erin Cram, PhD, Associate Dean, Research

Darien Wood, PhD, Associate Dean, Faculty Affairs

Tara Duffy, PhD, Associate Dean, Equity

Sam Inman, MBA, Associate Dean, Administration and Finance

Rachelle Reisberg, MS, Assistant Dean, Undergraduate Curriculum and Students

Tracy Tan, EdD, MBA, MA, Assistant Dean, Professional Programs

617.373.5085

617.373.8583 (fax)

cos@northeastern.edu

Graduate Student Services

617.373.4275

COSGradStudents@northeastern.edu

The College of Science seeks to offer advanced students outstanding academics and real-world research experience through cutting-edge research opportunities that are both discipline based and interdisciplinary. Our doctoral and master's degree programs in the physical sciences, life sciences, and mathematics seek to give students a deep understanding of emerging fields such as chemical biology, cognition and neuroscience, environmental and marine science, biochemistry, bioinformatics, biotechnology, nanoscience, and network science. Our programs are positioned at the forefront of discovery, invention, and innovation. We seek to prepare students and professionals to enter the scientific workforce serving the academic, government, or private sector.

Academic Policies and Procedures

- Academic Appeals Policies (p. 1115)
- Awards (p. 1117)
- Changes in Requirements (p. 1117)
- Cooperative Education Policies (p. 1117)
- Course Registration (p. 1118)
- The Doctor of Philosophy Degree (PhD) (p. 1119)
- Grading Policies (p. 1120)
- The Master's Degree Academic Requirements (p. 1120)
- Satisfactory Progress (p. 1120)
- Time Limitation (p. 1120)
- Transfer Credit (p. 143)

Academic Appeals Policies

Northeastern University affirms that it is essential to provide an appeals mechanism to students who believe that they have been erroneously, capriciously, or otherwise unfairly treated. Information about the university appeals process and procedures can be found in the Graduate Catalog. (p. 133)

If a student feels that they have been the victim of harassment or of discrimination prohibited by law or by university policy, and that this constitutes a substantive basis for the appeal, they should consult with the Office for University Equity and Compliance (<https://ouec.northeastern.edu/>) as soon as they become aware of alleged prohibited harassment or discrimination, and they are not required to wait until a term grade or determination is received before seeking advice or redress. If OUEC (<https://ouec.northeastern.edu/>) is advised of such alleged prohibited conduct as part of an academic appeal, the appeal shall first be pursued and investigated through OUEC (<https://ouec.northeastern.edu/>). Following a resolution of the harassment/discrimination issues, any remaining academic issues will be addressed, at the request of the student, according to the academic appeals procedures.

Before invoking the appeals procedures, students are encouraged to speak informally to their instructors or academic advisors about any determination or grade about which they have questions. If students choose to pursue an appeal, the College of Science process is described in the appeals section that follows. The Graduate Curriculum Committee, which is comprised of program and department directors, serves as the Academic Appeals Committee for the College of Science.

Grade Appeals

If a graduate student wishes to dispute a grade in a course taught by a member of the College of Science faculty, the first step is for the student to discuss their concerns with the faculty member who taught the course to see if it is possible to reach agreement on the issue(s). If the student is not able to resolve their issues with the faculty member who taught the course, the student should work with the department/program director to attempt a department-level resolution.

If these informal attempts to resolve the issue fail, the student can enter the formal procedure at the college level.

The student should meet with the associate dean who oversees the graduate program who will attempt to resolve the issue by working with the instructor and the department/program. Contact Graduate Student Services at COSGradStudents@northeastern.edu to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine whether or not there is just cause to convene the Graduate Curriculum Committee.

The decision to convene the Graduate Curriculum Committee will be based upon the following:

- The student sincerely attempted to resolve the complaint with the professor and the department/program.
- The complaint is substantive in nature (adjudication could affect student's course grade and/or academic record).
- The complaint has been brought forward in a timely manner.
 - The statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student.
 - If a student wishes to dispute a grade in their final term, this must be done within 28 calendar days of degree conferral date.

If the associate dean determines the appeal should be brought to the Graduate Curriculum Committee, the student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean.

- The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint.
 - It is the student's responsibility to make their case. Students may submit any evidence such as emails, quizzes, examinations, etc.
 - Information about the statement can be found under Step 2 Prepare an Appeal Statement—Academic Appeals Policies and Procedures in the (p. 133) *Northeastern University Academic Catalog*.

- Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the faculty member and to the department/program director and convene a meeting of the Graduate Curriculum Committee.
- If the student fails to provide a thoughtful and well-reasoned written summary of the case, then the matter will be considered closed at the college level.
- The associate dean will make a good faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of their statement.

GRADUATE CURRICULUM COMMITTEE

- The Graduate Curriculum Committee serves as the Academic Appeals Committee for the College of Science.
- The Graduate Curriculum Committee is convened in order to determine whether a fair and due process was used to determine the student's grade.
- The role of the committee is to conduct a review when a grade appeal is filed by a student for one of the following reasons:
 - The course grading policy was not applied consistently to all students within a class and/or section.
 - The instructor's method of assigning grades differed from the method outlined in the instructor's course syllabus.
 - The instructor failed to provide a clear policy on how grades would be assigned.

APPEALS MEETING

The student and the faculty member have the right to attend and present their case orally to the committee. The faculty member and the student are not required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the committee may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. The complainant and the faculty member both have the right to testify privately and separately before the committee. Lawyers are not permitted in these proceedings. Generally, the faculty member and complainant are each given a 15-minute period to present their case.

The student usually presents their complaint to the committee first. The committee may then ask the complainant any questions they have based upon either the written statement submitted by the complainant or the complainant's oral presentation. The faculty member then presents their case, which is followed by questions from the committee. After both the complainant and faculty member have addressed the committee, the committee then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the committee believes it cannot resolve any issues without additional information, the committee may request any information needed from either the complainant, faculty member, or department/program. This information must be provided to the committee within one week of the meeting. If the requested information is not provided in the required time frame, then the committee may weigh this failure in making its final determination regarding the original complaint.

COMMITTEE PROCESS

- All decisions of the committee will be made based on a simple majority (51%) vote.
- The associate dean is chair of the committee and only votes when there is a tie.
- The student bringing the complaint to the committee carries the burden of proof based on the weight of the evidence in demonstrating that the grade is incorrect or unjustified.
- If the committee decides that the grading process was unfair, the committee can request that the instructor changes the student's grade.
 - If an acceptable agreement involves a change of grade, the instructor is responsible for submitting a change of grade to the Office of the University Registrar in a timely manner following notification of the committee's decision.
- The student shall be notified within three business days of a decision being reached.

If the student or the faculty member is not satisfied with the committee's disposition of the matter, or if the grade appeal is not resolved within 35 calendar days after the written statement is submitted to the college, they may further pursue the matter by requesting in writing that the university convene an academic appeals resolution committee to review the issue. This must be submitted within 10 calendar days of the notification from the college. This committee has been designated as the final authority on these matters. Students may obtain information on this process by contacting the Office of the Provost.

Academic Dismissal Appeal

If a student wishes to dispute an academic dismissal, the first step is to consult the graduate director about appealing to the department/program. If and when all departmental appeals are exhausted, the student can enter the formal procedure at the college level.

The student will meet with the associate dean for graduate affairs and professional programs who will attempt to resolve the issue by working with the department/program. Contact Graduate Student Services to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine if the complaint is substantive and there is just cause to convene the Graduate Curriculum Committee.

The student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean. The statement must be submitted no later than 10 calendar days from the day when the academic determination is made available to the student. The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint. Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the department/program director and convene a meeting of the Graduate Curriculum Committee. If the student fails to provide a thoughtful and well-reasoned written summary of the case, then the matter will be considered closed at the college level.

The associate dean will make a good faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of their statement.

GRADUATE CURRICULUM COMMITTEE

- The Graduate Curriculum Committee serves as the Academic Appeals Committee for the College of Science.
- The Graduate Curriculum Committee is convened in order to determine whether a fair and due process was used.

APPEALS MEETING

The student has the right to attend and present their case orally to the committee. The student is not required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the committee may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. Lawyers are not permitted in these proceedings.

The student usually presents their complaint to the committee first. The committee may then ask the complainant questions based upon either the written case submitted by the complainant or the complainant's oral presentation. The committee then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the committee believes it cannot resolve any issues without additional information, the committee may request any information needed from either the complainant or department/program. This information must be provided to the committee within one week of the meeting. If the needed information is not provided in the time frame required, then the committee may weigh this failure in making its final determination regarding the original complaint.

COMMITTEE PROCESS

- All decisions of the committee will be made based on a simple majority (51%) vote.
- The associate dean is chair of the committee and only votes when there is a tie.
- The student bringing the complaint to the committee carries the burden of proof based on the weight of the evidence in demonstrating that the dismissal is incorrect or unjustified.
- If the committee decides that the academic dismissal should be revoked, the committee can request that the department reinstate the student immediately.

Decisions concerning dismissals cannot be appealed beyond the college level. While program dismissals cannot be appealed beyond the college level, underlying academic judgments that led to a dismissal can be appealed.

Awards

Only those students who are registered in degree programs are eligible for awards. Award recipients will receive an official award letter from the College of Science via email. Pay attention to this letter as it is an official contract that should be read carefully. In addition, to maintain awards, students must be making satisfactory progress toward their degrees.

Receipt of financial support administered by the College of Science is contingent on satisfactory academic progress toward the degree and on meeting department-specific guidelines. The College of Science requires that all students receiving awards will generally have two semesters to reach a 3.000 grade-point average. Students whose cumulative GPA is below 3.000 will be reviewed by their departments and by the College of Science and may have their funding terminated on recommendation of their department or by decision of the College of Science in consultation with their department. Renewals of awards will depend on the student making satisfactory academic progress toward the degree, including a GPA of 3.000 or the department's minimum GPA, if it is higher than the College of Science minimum, and satisfactory performance of any duties required by the award.

Changes in Requirements

The continuing development of the college may result in regular revision of curricula. When curriculum changes are made, students are allowed to complete the degree requirements of the program when they matriculated. If a student wishes to follow the new curriculum/program, they may request this in writing to the College of Science Graduate Student Services office at the time of the announcement of said changes.

Cooperative Education Policies

The College of Science Graduate Cooperative Education Program is one option for experiential learning and is available to students enrolled full time at Northeastern University in a degree-granting program.

The goals of cooperative education are for students to:

- **Integrate knowledge** and skills learned in the classroom and co-op to identify and solve problems
- **Gain new knowledge** and develop new skills to successfully engage in unfamiliar activities and projects
- **Identify and leverage opportunities** to learn beyond the classroom
- **Articulate** the intellectual skills that underlie the work they engage in
- **Assess, critique, and improve** their work

- **Adapt** their behavior to different audiences they interact with (e.g., communication, self-representation, etc.)
- **Behave professionally** in various environments (i.e., team, independent, etc.) by adhering to ethical standards and being accountable for their commitments

Eligibility Requirement for Co-op

Master's-level students must meet the eligibility requirements and follow the guidelines below. Co-op is not guaranteed, and it is strongly recommended that students conduct independent searches as well.

- To be eligible for co-op, College of Science graduate students must:
 - Be enrolled full time at Northeastern. For students enrolled part time, meet with your co-op advisor to discuss options.
 - Have completed a minimum of 16 master's-level academic credits prior to the start of co-op.
 - Meet the 3.000 minimum grade-point average requirement.
 - Have no incomplete grades, not be on academic probation, or have any outstanding disciplinary issues.
 - Depending on your program and campus, returning to courses after your co-op experience may be required. See your co-op and academic advisor for clarification.
- Graduate certificate students are not eligible for co-op.
- International students on an F-1 visa must have a valid I-20 and must follow Curricular Practical Training protocol.
- Students must successfully complete the Pathways to Professional Success (EESC 6500) course. This course covers the College of Science co-op performance standards, which encourage professional and ethical behaviors throughout the co-op process and clarify procedures required for continued success of students and the co-op program. The standards establish professional expectations of the student throughout the co-op search process and during the co-op term and address co-op related issues that may involve performance.
- Students must notify their co-op advisor when they receive a co-op offer.

Guidelines

1. Co-ops must be aligned with academic terms (fall, spring, and full summer or summer first half and summer second half).
2. Students may participate in co-op activities with a single company for four or six months for no fewer than 12 weeks and must align with the academic calendar.
3. Co-ops are required to be full time, a minimum of 32 hours per week.
4. Course enrollment while on co-op is dependent upon academic program.
5. Students can create their own co-op outside of NUworks. Approval from the co-op faculty and adherence to all guidelines are required.
6. Students working in industry must complete an industry project to fulfill the co-op requirement. This must be approved by your assigned co-op faculty/coordinator.
7. College of Science students are only allowed to complete one co-op work experience per degree.

Registering for Co-op

Students are registered for the co-op work experience course based on the co-op position in NUworks. All co-op positions must be aligned with the academic calendar and be approved by the co-op faculty.

Co-op Documentation

Students who fully and successfully participate in co-op will receive a grade of Satisfactory (S). Those who fail to complete their co-op assignment will receive a grade of Unsatisfactory (U). These grades will appear on the student's academic transcript. Academic credit is not awarded for the completed co-op.

Global University System

University and college cooperative education policies apply to students on all campuses.

The College of Science Co-op Standing Committee

In the event a situation arises that requires special consideration, the College of Science students who are dismissed from or resign from a co-op job will have an opportunity to meet with the co-op standing committee for a review. A decision will be made on future co-op eligibility and access to NUworks.

PhD Students

Please contact your department or Graduate Student Services to inquire about guidelines for experiential learning opportunities.

Course Registration

Students are encouraged to obtain advisor approval of course selections each semester. This approval is required for all assistantship recipients, and some departments require it for all students. Students should check with individual departments for specific guidelines.

The Doctor of Philosophy Degree (PhD)

The Doctor of Philosophy degree is awarded to candidates who provide evidence of high scholastic attainment and research ability in their major field. Specific degree requirements are administered by a committee in charge of the degree program. It is the responsibility of the chair of this committee to certify to the College of Science the completion of each requirement for each candidate.

Residence Requirement

A PhD student must spend the equivalent of at least one academic year in residence at Northeastern University as a full-time graduate student. The committee of each degree program specifies the method by which the residence requirement is satisfied.

Qualifying Exam

In programs where a qualifying exam is required, students must complete this requirement within the time limit set by the program of study.

Comprehensive Examination

Degree programs may require a comprehensive examination. Generally, students are expected to complete all of the required degree coursework prior to taking the comprehensive examination. Students must complete this requirement within the time limit set by the program of study, usually within one term of completing the required coursework.

Doctoral Degree Candidacy

PhD degree candidacy is established when students have completed all departmental and university requirements for candidacy. These requirements vary by department and include completing the minimum number of graduate semester hours required of doctoral students by the department (this may include an earned master's degree accepted by the department) and passing a qualifying examination and/or a comprehensive examination. Once students reach doctoral degree candidacy they will be certified, in writing, by the college. Registration in coursework is not permitted once a student reaches candidacy.

Continuity of Registration

For each of the first two semesters that a doctoral candidate has established candidacy, the student must register for Dissertation. For each semester beyond the two Dissertation registrations, the student must register for Doctoral Dissertation Continuation until the dissertation is approved by the College of Science. During the terms when a student is registered for Doctoral Dissertation or Dissertation Continuation, coursework is not permitted as the course requirements for the degree have already been met. If the academic program requires enrollment in seminars or courses in addition to Dissertation or Dissertation Continuation, the department's graduate director will make a recommendation to the College of Science for approval. Approval must happen prior to registration. Students must be registered for Dissertation or Dissertation Continuation during the semester in which they take the final oral examination (including the full summer semester if that is when defense occurs). Any student who does not attend Northeastern for a period of one year may be required to apply for readmission. A student who does not enroll for a period of three semesters, or one year, will be required to apply for readmission. Readmission is done via Slate. A student who does not enroll for a period of two semesters, or less than one year, may petition their department for reactivation. If the department is supportive, the student will be required to submit a written request to the departmental graduate committee. If the graduate committee feels the student is worthy of reactivation, the student's written request must be submitted to Graduate Student Services. Please note that college admissions deadlines apply to requests for readmission and reactivation.

Dissertation

The dissertation committee shall have at least three faculty members, two of whom shall be from Northeastern. The chair of the dissertation committee (who is presumed to be the thesis advisor) will be a full-time tenured or tenure-track member of the faculty of Northeastern and will hold a PhD (or other research doctorate) or an appropriate terminal degree for the discipline. Exceptions to this policy will be considered and, if appropriate, approved by the provost or their designee. Colleges may permit full-time faculty from other ranks to serve in this role based on the research qualifications and experience of individual faculty members.

The PhD committee should be appointed early enough to advise in the formulation of the student's program and in refining the research topic for the dissertation. Within the constraints of the above criteria, the PhD program faculty will determine the process by which dissertation committees are established. The final list of dissertation committee members shall be reported to the college's associate dean for graduate education or unit managing the degree program.

If a student's major advisor leaves Northeastern (including transition to emeritus status), that person may continue the research direction of the dissertation or thesis. However, a co-advisor must be appointed from the academic department or program. The student will then have two advisors, one an official member of the Northeastern faculty who will be available for research and administrative matters and the ex-Northeastern advisor. If a new major advisor is appointed, the former Northeastern faculty member may serve as an outside member of the committee.

Final Oral Examination

An oral defense of the dissertation is required and must be held at least 14 calendar days before the degree conferral date. The defense shall be conducted with the committee members present either in person or via electronic means. In the case where neither the candidate nor the committee members are present in person on campus (i.e., the candidate and all committee members are connected only remotely via electronic means), there shall be a location established and technology enabled for public, in-person attendance of the defense by the university community and this accommodation made known to the university.

Interdisciplinary Doctoral Programs

Some graduate students may wish to pursue doctoral programs that involve substantial work in two or more departments. To meet this need, an interdisciplinary program may be established that corresponds in scope and depth to doctoral standards but does not agree exactly with the individual departmental regulations. Consult this graduate catalog for policies and guidelines pertaining to this doctoral option.

Grading Policies

In the College of Science, not more than two courses or 6 semester hours of credit, whichever is greater, may be repeated to satisfy the requirements for the degree. Only such repeats will be counted in calculating the cumulative grade-point average.

No grade changes (p. 114) are permitted after the end of the final examination period one calendar year from the semester in which the student registered for the course. In calculating the overall cumulative average, all graduate-level coursework completed at the time of clearance, regardless of program, will be counted, including other coursework completed for graduate certificates, master's degrees, doctoral programs, and personal interest or professional development.

Students cannot elect a satisfactory/unsatisfactory grading scheme for College of Science courses, unless the course grading scheme is designated satisfactory/unsatisfactory.

The Master's Degree Academic Requirements

A candidate for the master's degree must complete a minimum of 30 semester hours of graduate-level coursework and such other study as may be required by the department in which the student is registered.

To qualify for the degree, a minimum cumulative grade-point average of 3.000, equivalent to a grade of B, must be obtained. This average will be calculated each semester according to the university grading system and will exclude any transfer credits and nonrepeatable courses that have been retaken. A student who does not make satisfactory progress toward degree requirements, as specified by the individual department, may be terminated from the program.

Comprehensive Examination

A final written or oral comprehensive examination is required in some programs. This examination will be given by the department concerned at least two weeks before the commencement at which the degree is expected to be conferred.

Thesis

A master's thesis is required in some programs and should demonstrate the individual's capacity to execute independent work based on original material. Registration for Thesis is required in most programs.

Theses must be approved by the departmental graduate committee and, in cases in which a grade is required, must receive a grade of B (3.000) or better to be accepted.

Continuity of Registration

Students are expected to maintain satisfactory progress toward their intended degrees. All students must be registered in the last semester of their program. A student who does not enroll for a period of three semesters, or one year, will be required to apply for readmission. Readmission is done via Slate. A student who does not enroll for a period of two semesters, or less than one year, may petition their department for reactivation. If the department is supportive, the student will be required to submit a written request to the departmental graduate committee. If the graduate committee feels the student is worthy of reactivation, the student's written request must be submitted to Graduate Student Services. Please note that college admissions deadlines apply to requests for readmission and reactivation.

Satisfactory Progress

Satisfactory progress means satisfying requirements in the College of Science, in this graduate catalog, and in the regulations specified by the departments.

The College of Science sets minimum standards for all students to fulfill. Departments and programs may have additional requirements that exceed those of the College of Science. Students in the College of Science must be making satisfactory progress, including working toward the graduation requirement of a grade-point average of 3.000 in their coursework and the timely completion of coursework and comprehensive/qualifying examinations. See also the university's policy on academic standing ("Minimum Cumulative GPA (p. 141)").

Time Limitation

Refer to Northeastern University policy regarding time limitations. If students wish to apply for an extension of the time limit, they must submit a petition to their department of study. The petition must include a detailed plan for completion of all remaining degree requirements. In the case of master's degree time limit extension requests for coursework, the department must certify that the content of each of the courses has not changed

since the time the student completed the course. If deemed appropriate, the department will recommend a time limit extension to Graduate Student Services. The associate dean has final approval of time limit extensions.

Biology

Website (<https://cos.northeastern.edu/biology/>)

James Monaghan, PhD

Professor and Chair

134 Mugar Life Sciences Building

617.373.6539

617.373.3724 (fax)

gradbio@northeastern.edu

The PhD program in biology emphasizes close interaction between graduate students and faculty in developing the intellectual and experimental skills required for creative independent research. Rigorous courses in a core biology curriculum, as well as advanced courses in particular research interests, are complemented by intensive research culminating in completion of a dissertation under faculty supervision. Students have an opportunity to declare a concentration in either cell and molecular biology or molecular microbiology.

The Department of Biology oversees the bioinformatics Master of Science program. The interdisciplinary program provides cross-disciplinary training in biology, computer science, and informational technology, preparing students for cutting-edge jobs in the biotechnology and pharmaceutical industries. The program consists of four parts: fundamental courses, core courses, co-op and experiential learning, and electives.

The Graduate Certificate in Bioinformatics offers professionals working in the research, healthcare, and pharmaceutical industries the ability to employ bioinformatics algorithms and techniques to biological problems in their current practice. It also gives people looking to switch careers the data and genomic analysis skills needed to be more competitive in the biological and pharmaceutical industries.

The Graduate Certificate in Omics provides students the opportunity to explore in detail the key genomic technologies and computational approaches that are driving advances in prognostics, diagnostics, and treatment, learning how scientists sequence, assemble, and analyze the function and structure of genomes. The certificate explores methods for determining traits and diseases by studying the larger population as well as how gene identification can help identify targets for therapeutic intervention. Students that are already in the field or have an interest will significantly benefit from a certificate like this.

Programs

Doctor of Philosophy (PhD)

- Biology (Boston) (p. 1121)

Master of Science (MS)

- Bioinformatics (Boston) (p. 1123)
- Bioinformatics (Oakland) (p. 1127)
- Bioinformatics (Portland) (p. 1130)
- Bioinformatics (Toronto) (p. 1133)
- Cell and Gene Therapies (Boston) (p. 1135)

Graduate Certificate

- Bioinformatics (Boston) (p. 1136)
- Bioinformatics (Portland) (p. 1138)
- Omics (Boston) (p. 1139)

Biology, PhD (Boston)

The PhD program entails course work from a core biology curriculum along with advanced courses in the student's area of research interest. This is complemented by intensive research and completion of a dissertation under faculty supervision. Faculty research includes biochemistry, microbiology, cell and molecular biology, genetics, neurobiology, regenerative biology, and the biology of reproduction. Two optional concentrations are available: cell and molecular biology and molecular microbiology.

Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an (https://catalog.northeastern.edu/graduate/social-sciences-humanities/sociology/sociology-ma/)MS Biology (https://catalog.northeastern.edu/graduate/science/biology/biology-ms/) degree. In addition, students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Biology (https://catalog.northeastern.edu/graduate/science/biology/biology-ms/) degree. Note that

no students will be admitted directly into the MS Biology (<https://catalog.northeastern.edu/graduate/science/biology/biology-ms/>) to pursue a master's degree.

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Annual review
Dissertation committee
Dissertation proposal
Colloquia (minimum of three)
First-author publication
Dissertation defense

Core Requirements

Code	Title	Hours
Research Ethics		
BIOL 7399	Research Problem Solving, Ethics, and Communication Skills	4
Colloquium		
Complete the following (repeatable) course twice:		2
BIOL 5100	Biology Colloquium	

Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Cell and Molecular Biology Concentration (p. 1122)
- Molecular Microbiology Concentration (p. 1122)
- Electives Option (p. 1123)

Dissertation

Code	Title	Hours
BIOL 9990	Dissertation Term 1	
BIOL 9991	Dissertation Term 2	

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

CELL AND MOLECULAR BIOLOGY CONCENTRATION

Code	Title	Hours
Required Coursework		
BIOL 6300	Biochemistry	4
Electives		
In consultation with faculty advisor, complete 20 semester hours from the topic of cell and molecular biology:		20
BIOL 5103 to BIOL 9984		

MOLECULAR MICROBIOLOGY CONCENTRATION

Code	Title	Hours
Required Coursework		
BIOL 6300	Biochemistry	4
BIOL 6405	Prokaryotic Cell and Molecular Biology	4
Electives		
In consultation with faculty advisor, complete 16 semester hours from the topic of molecular microbiology:		16
BIOL 5103 to BIOL 9984		

ELECTIVES OPTION

Code	Title	Hours
Required Coursework		
Complete 8 semester hours from the following:		8
BIOL 6303	Neurobiology and Behavior	
BIOL 6405	Prokaryotic Cell and Molecular Biology	
Electives		
Complete 16 semester hours from the following:		16
BIOL 5103 to BIOL 9984		

Advanced Entry Program Requirements

The biology PhD program seeks to provide a broad background knowledge base in conjunction with in-depth study of a specialized area of biology. The program emphasizes close interaction between graduate students and faculty members in developing the intellectual and experimental skills required for creative, independent research.

Students entering the PhD program with a related Master of Science degree typically have significantly reduced course loads. An individualized course of study is designed by the biology graduate curriculum committee in consultation with the student and the student's advisor. The student can then focus on intensive research and completion of a dissertation under faculty supervision. Faculty research includes biochemistry, microbiology, cell and molecular biology, genetics, neurobiology, regenerative biology, and the biology of reproduction. Financial support (teaching assistantships or research assistantships) is normally provided for PhD students who are making satisfactory progress toward completion of their degree.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Annual review
Dissertation committee
Dissertation proposal
Colloquia (minimum of three)
First-author publication
Dissertation defense

Core Requirements**APPROVED COURSE WORK**

Consult your faculty advisor for acceptable courses.

APPROVED ELECTIVES

Consult your faculty advisor for acceptable electives.

Dissertation

Code	Title	Hours
BIOL 9990	Dissertation Term 1	
BIOL 9991	Dissertation Term 2	

Program Credit/GPA Requirements

Variable total semester hours required
Minimum 3.000 GPA required

Bioinformatics, MS (Boston)

The Master of Science in Bioinformatics seeks to provide students with core knowledge in bioinformatics programming, integrating knowledge from the biological, computational, and mathematical disciplines. Upon completion, students are equipped to apply bioinformatics and computational methods to biological problems. Students in the MS program have the opportunity to gain professional work experience via co-op.

The program consists of core coursework in computational methods, programming, and statistics, enhanced by electives in molecular biology, biochemistry, molecular modeling, web development, database design and management, data mining, and other related topics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Programming		
BINF 6200	Bioinformatics Programming	4
Computational Methods		
BINF 6310	Introduction to Bioinformatics	4
Statistics		
MATH 7340	Statistics for Bioinformatics	4
Research and Seminar		
Complete one of the following:		1-2
BIOL 6381	Ethics in Biological Research	
NNMD 5310	Bioethics in the Age of Artificial Intelligence	
Professional Development		
EESC 6500	Pathways to Professional Success	1

Concentration or Electives Option

A concentration is not required. Students who choose not to declare a concentration will complete the electives option.

- Bioinformatics Enterprise (p. 1124)
- Biotechnology (p. 1124)
- Data Analytics (p. 1124)
- Health Informatics (p. 1125)
- Omics (p. 1125)
- Electives Option (p.)

Optional Co-op Experience

Code	Title	Hours
BINF 6964	Co-op Work Experience	0
or BINF 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

CONCENTRATION IN BIOINFORMATICS ENTERPRISE

Code	Title	Hours
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5225	Managing and Leading a Biotechnology Company	3
BIOT 5228	Planning and Executing Biotechnology Projects	3
Complete 6 semester hours of coursework from the restricted electives list below. (p. 1125)		6
Complete 4 semester hours of coursework from the restricted electives or additional electives lists below.		4

CONCENTRATION IN BIOTECHNOLOGY

Code	Title	Hours
BIOT 5120	Foundations in Biotechnology	3
BIOT 5621	Protein Principles in Biotechnology	3
BIOT 5750	Molecular Approaches in Biotechnology	3
Complete 5 semester hours of coursework from the restricted electives list below. (p. 1125)		5
Complete 4 semester hours of coursework from the restricted electives or additional electives lists below.		4

CONCENTRATION IN DATA ANALYTICS

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning (or Elective)	4
Complete one of the following:		4

INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
Complete 3 semester hours from the restricted electives list below. (p. 1125)		3
Complete 3 semester hours of coursework from the restricted electives or additional electives lists below.		3

CONCENTRATION IN HEALTH INFORMATICS

Code	Title	Hours
Complete at least 9 semester hours from the following:		9
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5102	Data Management in Healthcare	
HINF 5105	The American Healthcare System	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 6220	Database Design, Access, Modeling, and Security	
Complete 5 semester hours of coursework from the restricted electives list below. (p. 1125)		5
Complete 4 semester hours of coursework from the restricted electives or additional electives lists below.		4

CONCENTRATION IN OMICS

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	4
BINF 6420	Omics in Bioinformatics	4
BINF 6430	Transcriptomics in Bioinformatics	4
Complete 6 semester hours of coursework from the restricted electives or additional electives lists below.		6

ELECTIVES OPTION

Code	Title	Hours
Complete 10 hours from the restricted electives list below. (p. 1125)		10
Complete 8 semester hours of coursework from the restricted electives or additional electives lists below.		8

RESTRICTED ELECTIVES

Code	Title	Hours
BINF 6250	Algorithmic Foundations in Bioinformatics	
BINF 6400	Genomics in Bioinformatics	
BINF 6420	Omics in Bioinformatics	
BINF 6430	Transcriptomics in Bioinformatics	
BIOL 5100	Biology Colloquium	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5585	Evolution	
BIOL 5593	Cell and Molecular Biology of Aging	
BIOL 6301	Molecular Cell Biology	
BIOT 5120	Foundations in Biotechnology	
BIOT 5145	Biotechnology Lab Skills	
BIOT 5219	The Biotechnology Enterprise	
BIOT 5621	Protein Principles in Biotechnology	
BIOT 5750	Molecular Approaches in Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
CHEM 5620	Protein Chemistry	
CHEM 5638	Molecular Modeling	
CS 5004	Object-Oriented Design	
CS 5008	Data Structures, Algorithms, and Their Applications within Computer Systems	
CS 5010	Programming Design Paradigm	
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5400	Principles of Programming Language	

CS 5500	Foundations of Software Engineering
CS 5600	Computer Systems
CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
DAMG 6105	Data Science Engineering with Python
DS 5010	Introduction to Programming for Data Science
DS 5020	Introduction to Linear Algebra and Probability for Data Science
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
EEMB 5130	Population Dynamics
HINF 6220	Database Design, Access, Modeling, and Security
INFO 6105	Data Science Engineering Methods and Tools
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
MATH 5131	Introduction to Mathematical Methods and Modeling
MATH 7207	Algorithms for Optimization
MATH 7243	Machine Learning and Statistical Learning Theory 1
MATH 7339	Machine Learning and Statistical Learning Theory 2
MATH 7342	Mathematical Statistics
MATH 7344	Regression, ANOVA, and Design
NNMD 5310	Bioethics in the Age of Artificial Intelligence
PHSC 6214	Experimental Design and Biostatistics

ADDITIONAL ELECTIVES

Code	Title	Hours
Electives outside this list may be chosen in consultation with faculty advisor:		
BIOE 5235	Biomedical Imaging	
BIOE 5420	Cellular Engineering	
BIOE 6100	Medical Physiology	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5573	Medical Microbiology	
BIOL 5581	Biological Imaging	
BIOL 5583	Immunology	
BIOL 5585	Evolution	
BIOL 5587	Comparative Neurobiology	
BIOL 5591	Advanced Genomics	
BIOL 5821	Cell and Gene Therapies	
BIOL 6300	Biochemistry	
BIOL 6303	Neurobiology and Behavior	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5228	Planning and Executing Biotechnology Projects	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5820	Cellular Therapies	
BIOT 5840	Cell and Gene Therapy Lab	
BIOT 7245	Biotechnology Applications Laboratory	

BIOT 7983	Special Topics in Biotechnology
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis
CHEM 5617	Protein Mass Spectrometry Laboratory
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 6620	Fundamentals of Cloud Computing
CS 7150	Deep Learning
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5102	Data Management in Healthcare
HINF 5105	The American Healthcare System
HINF 5110	Global Health Information Management
HINF 5200	Theoretical Foundations in Personal Health Informatics
INSH 5301	Introduction to Computational Statistics
MATH 7203	Numerical Analysis 1
MATH 7205	Numerical Analysis 2
MATH 7233	Graph Theory
MATH 7241	Probability 1
MATH 7341	Probability 2
NNMD 5370	Nanomedicine Research Techniques
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies
PHYS 5116	Network Science 1
PHYS 7332	Network Science Data 2

Bioinformatics, MS (Oakland)

The Master of Science (MS) in Bioinformatics seeks to provide students with core knowledge in bioinformatics programming, integrating knowledge from the biological, computational, and mathematical disciplines. Upon completion, students are equipped to apply bioinformatics and computational methods to biological problems. Students in the MS program have the opportunity to gain professional work experience via co-op.

The program consists of core course work in computational methods, programming, and statistics, enhanced by electives in molecular biology, biochemistry, molecular modeling, web development, database design and management, data mining, and other related topics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Programming		
BINF 6200	Bioinformatics Programming	4
Computational Methods		
BINF 6310	Introduction to Bioinformatics	4
Statistics		
MATH 7340	Statistics for Bioinformatics	4
Research and Seminar		
Complete one of the following:		1-2
BIOL 6381	Ethics in Biological Research	
NNMD 5310	Bioethics in the Age of Artificial Intelligence	
Professional Development		
EESC 6500	Pathways to Professional Success	1

Concentration or Electives Option

A concentration is not required. Students who choose not to declare a concentration will complete the Electives Option.

- Biotechnology (p. 1128)
- Omics (p. 1128)
- Electives Option (p. 1128)

Optional Co-op Experience

Code	Title	Hours
BINF 6964	Co-op Work Experience	0
or BINF 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

BIOTECHNOLOGY CONCENTRATION

Code	Title	Hours
BIOT 5120	Foundations in Biotechnology	3
BIOT 5621	Protein Principles in Biotechnology	3
BIOT 5750	Molecular Approaches in Biotechnology	3
Complete 5 semester hours of coursework from the Restricted Electives list below. (p. 1128)		5
Complete 4 semester hours of coursework from the Restricted Electives or Additional Electives lists below.		4

OMICS CONCENTRATION

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	4
BINF 6420	Omics in Bioinformatics	4
BINF 6430	Transcriptomics in Bioinformatics	4
Complete 6 semester hours of coursework from the Restricted Electives or Additional Electives lists below.		6

ELECTIVES OPTION

Code	Title	Hours
Complete 10 semester hours of coursework from the Restricted Electives list below. (p. 1128)		10
Complete 8 semester hours of coursework from the Restricted Electives or Additional Electives lists.		8

RESTRICTED ELECTIVES

Code	Title	Hours
BINF 6250	Algorithmic Foundations in Bioinformatics	
BINF 6400	Genomics in Bioinformatics	
BINF 6420	Omics in Bioinformatics	
BINF 6430	Transcriptomics in Bioinformatics	
BIOL 5100	Biology Colloquium	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5585	Evolution	
BIOL 5593	Cell and Molecular Biology of Aging	
BIOL 6301	Molecular Cell Biology	
BIOT 5120	Foundations in Biotechnology	
BIOT 5145	Biotechnology Lab Skills	
BIOT 5219	The Biotechnology Enterprise	
BIOT 5621	Protein Principles in Biotechnology	
BIOT 5750	Molecular Approaches in Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
CHEM 5620	Protein Chemistry	
CHEM 5638	Molecular Modeling	
CS 5004	Object-Oriented Design	
CS 5008	Data Structures, Algorithms, and Their Applications within Computer Systems	
CS 5010	Programming Design Paradigm	
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	

CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5600	Computer Systems
CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
DAMG 6105	Data Science Engineering with Python
DS 5010	Introduction to Programming for Data Science
DS 5020	Introduction to Linear Algebra and Probability for Data Science
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
EEMB 5130	Population Dynamics
HINF 6220	Database Design, Access, Modeling, and Security
INFO 6105	Data Science Engineering Methods and Tools
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
MATH 5131	Introduction to Mathematical Methods and Modeling
MATH 7207	Algorithms for Optimization
MATH 7243	Machine Learning and Statistical Learning Theory 1
MATH 7339	Machine Learning and Statistical Learning Theory 2
MATH 7342	Mathematical Statistics
MATH 7344	Regression, ANOVA, and Design
NNMD 5310	Bioethics in the Age of Artificial Intelligence
PHSC 6214	Experimental Design and Biostatistics

ADDITIONAL ELECTIVES

Code	Title	Hours
Electives outside this list may be chosen in consultation with faculty advisor:		
BIOE 5235	Biomedical Imaging	
BIOE 5420	Cellular Engineering	
BIOE 6100	Medical Physiology	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5573	Medical Microbiology	
BIOL 5581	Biological Imaging	
BIOL 5583	Immunology	
BIOL 5585	Evolution	
BIOL 5587	Comparative Neurobiology	
BIOL 5591	Advanced Genomics	
BIOL 5821	Cell and Gene Therapies	
BIOL 6300	Biochemistry	
BIOL 6303	Neurobiology and Behavior	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5228	Planning and Executing Biotechnology Projects	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5820	Cellular Therapies	
BIOT 5840	Cell and Gene Therapy Lab	

BIOT 7245	Biotechnology Applications Laboratory
BIOT 7983	Special Topics in Biotechnology
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis
CHEM 5617	Protein Mass Spectrometry Laboratory
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 6620	Fundamentals of Cloud Computing
CS 7150	Deep Learning
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5102	Data Management in Healthcare
HINF 5105	The American Healthcare System
HINF 5110	Global Health Information Management
HINF 5200	Theoretical Foundations in Personal Health Informatics
INSH 5301	Introduction to Computational Statistics
MATH 7203	Numerical Analysis 1
MATH 7205	Numerical Analysis 2
MATH 7233	Graph Theory
MATH 7241	Probability 1
MATH 7341	Probability 2
NNMD 5370	Nanomedicine Research Techniques
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies
PHYS 5116	Network Science 1
PHYS 7332	Network Science Data 2

Bioinformatics, MS (Portland)

The Master of Science (MS) in Bioinformatics seeks to provide students with core knowledge in bioinformatics programming, integrating knowledge from the biological, computational, and mathematical disciplines. Upon completion, students are equipped to apply bioinformatics and computational methods to biological problems. Students in the MS program have the opportunity to gain professional work experience via co-op.

The program consists of core course work in computational methods, programming, and statistics, enhanced by electives in molecular biology, biochemistry, molecular modeling, web development, database design and management, data mining, and other related topics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Programming		
Complete one of the following:		4
BINF 6200	Bioinformatics Programming	
CS 5001	Intensive Foundations of Computer Science	
Computational Methods		
BINF 6310	Introduction to Bioinformatics	4
Statistics		
MATH 7340	Statistics for Bioinformatics	4
Research and Seminar		
Complete one of the following:		1-2
BIOL 6381	Ethics in Biological Research	
NNMD 5310	Bioethics in the Age of Artificial Intelligence	
Professional Development		
EESC 6500	Pathways to Professional Success	1

Concentration or Electives Option

A concentration is not required. Students who choose not to declare a concentration will complete the Electives Option.

- Biotechnology (p. 1131)
- Data Analytics (p. 1131)
- Omics (p. 1131)
- Electives Option (p. 1131)

Optional Co-op Experience

Code	Title	Hours
BINF 6964	Co-op Work Experience	0
or BINF 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

BIOTECHNOLOGY CONCENTRATION

Code	Title	Hours
BIOT 5120	Foundations in Biotechnology	3
BIOT 5621	Protein Principles in Biotechnology	3
BIOT 5750	Molecular Approaches in Biotechnology	3
Complete 5 semester hours of coursework from the Restricted Electives list below. (p. 1131)		5
Complete 4 semester hours of coursework from the Restricted Electives or Additional Electives lists below.		4

DATA ANALYTICS CONCENTRATION

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning (or Elective)	4
Complete one of the following:		4
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics (Complete one of the following:)	
Complete 3 semester hours of coursework from the Restricted Electives list below. (p. 1131)		3
Complete 3 semester hours of coursework from the Restricted Electives or Additional Electives lists below.		3

OMICS CONCENTRATION

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	4
BINF 6420	Omics in Bioinformatics	4
BINF 6430	Transcriptomics in Bioinformatics	4
Complete 6 semester hours of coursework from the Restricted Electives or Additional Electives lists below.		6

ELECTIVES OPTION

Code	Title	Hours
Complete 10 hours from the Restricted Elective List (p. 1131)		10
Complete 8 semester hours of coursework from the Restricted Electives or Additional Electives lists below.		8

RESTRICTED ELECTIVES

Code	Title	Hours
BINF 6250	Algorithmic Foundations in Bioinformatics	
BINF 6400	Genomics in Bioinformatics	
BINF 6420	Omics in Bioinformatics	
BINF 6430	Transcriptomics in Bioinformatics	
BIOL 5100	Biology Colloquium	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5585	Evolution	
BIOL 5593	Cell and Molecular Biology of Aging	

BIOL 6301	Molecular Cell Biology
BIOT 5120	Foundations in Biotechnology
BIOT 5145	Biotechnology Lab Skills
BIOT 5219	The Biotechnology Enterprise
BIOT 5621	Protein Principles in Biotechnology
BIOT 5750	Molecular Approaches in Biotechnology
BIOT 5850	Higher-Order Structure Analytics
CHEM 5620	Protein Chemistry
CHEM 5638	Molecular Modeling
CS 5004	Object-Oriented Design
CS 5008	Data Structures, Algorithms, and Their Applications within Computer Systems
CS 5010	Programming Design Paradigm
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5600	Computer Systems
CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
DAMG 6105	Data Science Engineering with Python
DS 5010	Introduction to Programming for Data Science
DS 5020	Introduction to Linear Algebra and Probability for Data Science
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
EEMB 5130	Population Dynamics
HINF 6220	Database Design, Access, Modeling, and Security
INFO 6105	Data Science Engineering Methods and Tools
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
MATH 5131	Introduction to Mathematical Methods and Modeling
MATH 7207	Algorithms for Optimization
MATH 7243	Machine Learning and Statistical Learning Theory 1
MATH 7339	Machine Learning and Statistical Learning Theory 2
MATH 7342	Mathematical Statistics
MATH 7344	Regression, ANOVA, and Design
NNMD 5310	Bioethics in the Age of Artificial Intelligence
PHSC 6214	Experimental Design and Biostatistics

ADDITIONAL ELECTIVES

Code	Title	Hours
Electives outside this list may be chosen in consultation with faculty advisor:		
BIOE 5235	Biomedical Imaging	
BIOE 5420	Cellular Engineering	
BIOE 6100	Medical Physiology	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5573	Medical Microbiology	
BIOL 5581	Biological Imaging	
BIOL 5583	Immunology	
BIOL 5585	Evolution	

BIOL 5587	Comparative Neurobiology
BIOL 5591	Advanced Genomics
BIOL 5821	Cell and Gene Therapies
BIOL 6300	Biochemistry
BIOL 6303	Neurobiology and Behavior
BIOT 5225	Managing and Leading a Biotechnology Company
BIOT 5228	Planning and Executing Biotechnology Projects
BIOT 5560	Bioprocess Fundamentals
BIOT 5635	Downstream Processes for Biopharmaceutical Production
BIOT 5640	Drug Product Processes for Biopharmaceuticals
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology
BIOT 5820	Cellular Therapies
BIOT 5840	Cell and Gene Therapy Lab
BIOT 7245	Biotechnology Applications Laboratory
BIOT 7983	Special Topics in Biotechnology
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis
CHEM 5617	Protein Mass Spectrometry Laboratory
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 6620	Fundamentals of Cloud Computing
CS 7150	Deep Learning
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5102	Data Management in Healthcare
HINF 5105	The American Healthcare System
HINF 5110	Global Health Information Management
HINF 5200	Theoretical Foundations in Personal Health Informatics
INSH 5301	Introduction to Computational Statistics
MATH 7203	Numerical Analysis 1
MATH 7205	Numerical Analysis 2
MATH 7233	Graph Theory
MATH 7241	Probability 1
MATH 7341	Probability 2
NNMD 5370	Nanomedicine Research Techniques
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies
PHYS 5116	Network Science 1
PHYS 7332	Network Science Data 2

Bioinformatics, MS (Toronto)

The Master of Science in Bioinformatics seeks to provide students with core knowledge in bioinformatics programming, integrating knowledge from the biological, computational, and mathematical disciplines. Upon completion, students are equipped to apply bioinformatics and computational methods to biological problems. Students in the MS program have the opportunity to gain professional work experience via co-op.

The program consists of core coursework in computational methods, programming, and statistics, enhanced by electives in molecular biology, biochemistry, molecular modeling, web development, database design and management, data mining, and other related topics.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Programming		
BINF 6200	Bioinformatics Programming	4
Computational Methods		

BINF 6310	Introduction to Bioinformatics	4
Statistics		
MATH 7340	Statistics for Bioinformatics	4
Research and Seminar		
BIOL 6381	Ethics in Biological Research	2
Professional Development		
BINF 6964	Co-op Work Experience	0
or BINF 5964	Projects for Professionals	
BINF 7700	Bioinformatics Research Directions	4
BIOT 5219	The Biotechnology Enterprise	2
EESC 6500	Pathways to Professional Success	1
or BINF 6500	Professional Development for Co-op	

Concentration or Electives Option

A concentration is not required. Students who choose not to declare a concentration will complete the electives option.

- Bioinformatics Enterprise (p. 1134)
- Biotechnology (p. 1134)
- Omics (p. 1134)
- Electives Option (p. 1134)

Program Credit/GPA Requirements

32 total semester hours required

(Additional hours may be required based on choice of concentration)

Minimum 3.000 GPA required

CONCENTRATION IN BIOINFORMATICS ENTERPRISE

Code	Title	Hours
BIOT 5225	Managing and Leading a Biotechnology Company	3
BIOT 5228	Planning and Executing Biotechnology Projects	3
BIOT 5500	Concepts in Regulatory Science	3

CONCENTRATION IN BIOTECHNOLOGY

Code	Title	Hours
BIOT 5120	Foundations in Biotechnology	3
BIOT 5621	Protein Principles in Biotechnology	3
BIOL 6299	Molecular Cell Biology for Biotechnology	3

CONCENTRATION IN OMICS

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	4
BINF 6420	Omics in Bioinformatics	4
BINF 6430	Transcriptomics in Bioinformatics	4

ELECTIVES OPTION

Code	Title	Hours
Complete 11 semester hours of coursework from the electives list below.		11

ELECTIVES LIST

Complete the remaining semester hours from the approved electives list below. Students who declare the omics concentration are not required to complete electives.

Code	Title	Hours
BIOT 5145	Biotechnology Lab Skills	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	
BIOT 5330	Drug Safety and Immunogenicity	

BIOT 5340	Introduction to Biotherapeutic Approvals
BIOT 5500	Concepts in Regulatory Science
BIOT 5560	Bioprocess Fundamentals
BIOT 5635	Downstream Processes for Biopharmaceutical Production
BIOT 5640	Drug Product Processes for Biopharmaceuticals
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology
BIOT 5850	Higher-Order Structure Analytics
BIOT 6100	Agricultural Biotechnology
BIOT 6214	Experimental Design and Biostatistics
BIOT 6300	Pharmaceutical Microbiology
BIOT 6320	Design and Development of Biopharmaceuticals
BIOT 6340	Sterile Manufacturing Operations
BIOT 7245	Biotechnology Applications Laboratory
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis
CHEM 5620	Protein Chemistry
INSH 5301	Introduction to Computational Statistics

Cell and Gene Therapies, MS (Boston)

Northeastern University's Master of Science in Cell and Gene Therapies is a professional master's program, an innovative, nonthesis graduate degree. It combines advanced interdisciplinary training in advanced therapies, such as cell therapies and gene therapies, with the development of high-value business skills critical to success in today's dynamic workplace. This program is designed to prepare graduates to innovate, collaborate, and lead as research, managerial, or technical professionals in a wide range of the cell and gene therapies fields.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
Required Core		
BIOL 5543	Stem Cells and Regeneration	4
BIOL 5821	Cell and Gene Therapies	4
BIOT 5840	Cell and Gene Therapy Lab	3
BIOL 5583	Immunology	4
BIOT 5830	Regulatory Landscape of Cell and Gene Therapies	2
BIOL 6216	Applied Bioinformatics	4
BIOL 6381	Ethics in Biological Research	2
PMST 6254	Advanced Drug Delivery Systems	3
Co-op		
EESC 6500	Pathways to Professional Success	1
EESC 6964	Co-op Work Experience	0
or BIOT 7001	Managing Innovation in Biotechnology	
Elective		
Complete a minimum of 5 semester hours from the following to meet the 32 total hours for the program:		5
BIOE 6000	Principles of Bioengineering	
BIOL 5100	Biology Colloquium	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5573	Medical Microbiology	
BIOL 5587	Comparative Neurobiology	
BIOL 5591	Advanced Genomics	
BIOL 5595	Cell and Molecular Neuroscience	
BIOT 5145	Biotechnology Lab Skills	
BIOT 5219	The Biotechnology Enterprise	
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	
BIOT 5330	Drug Safety and Immunogenicity	

BIOT 5340	Introduction to Biotherapeutic Approvals
BIOT 5401	Scientific Communication and Problem Solving in Biotechnology
BIOT 5560	Bioprocess Fundamentals
BIOT 5630	Cell Culture Applications for Biopharmaceuticals
BIOT 5635	Downstream Processes for Biopharmaceutical Production
BIOT 5850	Higher-Order Structure Analytics
BIOT 6300	Pharmaceutical Microbiology
BIOT 6320	Design and Development of Biopharmaceuticals
BIOT 6340	Sterile Manufacturing Operations
CHME 5101	Fundamentals of Chemical Engineering: Fluid, Heat, and Mass Transfer
CHME 5160	Drug Delivery: Engineering Analysis
CHME 5185	Design of Experiments and Ethical Research (DOEER)
CHME 5631	Biomaterials Principles and Applications
CHME 5632	Advanced Topics in Biomaterials
NNMD 5270	Foundations in Nanomedicine: Therapeutics
NNMD 5271	Foundations in Nanomedicine: Diagnostics
NNMD 5272	Nanomedicine Seminar

Program Credit/GPA Requirements

32 semester hours required

Minimum 3.000 GPA required

Bioinformatics, Graduate Certificate (Boston)

The Graduate Certificate in Bioinformatics seeks to provide students with core knowledge in bioinformatics programming, integrating knowledge from the biological, computational, and mathematical disciplines. Students have an opportunity to gain the data and genomic analysis skills needed to employ bioinformatics techniques to biological problems. The graduate certificate consists of four courses, three bioinformatics courses and one elective, totaling 15–16 semester hours.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BINF 6200	Bioinformatics Programming	4
BINF 6310	Introduction to Bioinformatics	4
BINF 6400	Genomics in Bioinformatics	4
or BINF 6430	Transcriptomics in Bioinformatics	

Elective

Code	Title	Hours
Complete one of the following (electives outside this list may be chosen in consultation with faculty advisor):		3-4
BINF 6400	Genomics in Bioinformatics	
BINF 6420	Omics in Bioinformatics	
BINF 6430	Transcriptomics in Bioinformatics	
BIOE 5235	Biomedical Imaging	
BIOE 5410	Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 6100	Medical Physiology	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5573	Medical Microbiology	
BIOL 5581	Biological Imaging	
BIOL 5583	Immunology	
BIOL 5585	Evolution	
BIOL 5587	Comparative Neurobiology	

BIOL 5591	Advanced Genomics
BIOL 5593	Cell and Molecular Biology of Aging
BIOL 5597	Immunotherapies of Cancer and Infectious Disease
BIOL 6299	Molecular Cell Biology for Biotechnology
BIOL 6300	Biochemistry
BIOL 6301	Molecular Cell Biology
BIOL 6303	Neurobiology and Behavior
BIOT 5120	Foundations in Biotechnology
BIOT 5145	Biotechnology Lab Skills
BIOT 5219	The Biotechnology Enterprise
BIOT 5225	Managing and Leading a Biotechnology Company
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship
BIOT 5560	Bioprocess Fundamentals
BIOT 5635	Downstream Processes for Biopharmaceutical Production
BIOT 5640	Drug Product Processes for Biopharmaceuticals
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology
BIOT 5850	Higher-Order Structure Analytics
BIOT 7245	Biotechnology Applications Laboratory
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis
CHEM 5617	Protein Mass Spectrometry Laboratory
CHEM 5620	Protein Chemistry
CS 5010	Programming Design Paradigm
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5800	Algorithms
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
MATH 5131	Introduction to Mathematical Methods and Modeling
MATH 7203	Numerical Analysis 1
MATH 7205	Numerical Analysis 2
MATH 7233	Graph Theory
MATH 7241	Probability 1
MATH 7340	Statistics for Bioinformatics
MATH 7341	Probability 2
MATH 7342	Mathematical Statistics
MATH 7344	Regression, ANOVA, and Design
PHSC 6214	Experimental Design and Biostatistics
PHYS 5116	Network Science 1

Program Credit/GPA Requirements

15–16 total semester hours required

Minimum 3.000 GPA required

Bioinformatics, Graduate Certificate (Portland)

The Graduate Certificate in Bioinformatics seeks to provide students with core knowledge in bioinformatics programming, integrating knowledge from the biological, computational, and mathematical disciplines. Students gain the data and genomic analysis skills needed to employ bioinformatics techniques to biological problems. The graduate certificate consists of four courses, three bioinformatics courses and one elective, totaling 15–16 semester hours.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BINF 6200	Bioinformatics Programming	4
BINF 6308	Bioinformatics Computational Methods 1	4
BINF 6309	Bioinformatics Computational Methods 2	4

Elective

Code	Title	Hours
Complete one of the following. Electives outside this list may be chosen in consultation with faculty advisor.		3-4
BINF 6400	Genomics in Bioinformatics	
BINF 6420	Omics in Bioinformatics	
BIOE 5235	Biomedical Imaging	
BIOE 5410	Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 6100	Medical Physiology	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5573	Medical Microbiology	
BIOL 5581	Biological Imaging	
BIOL 5583	Immunology	
BIOL 5585	Evolution	
BIOL 5587	Comparative Neurobiology	
BIOL 5591	Advanced Genomics	
BIOL 5593	Cell and Molecular Biology of Aging	
BIOL 5597	Immunotherapies of Cancer and Infectious Disease	
BIOL 6299	Molecular Cell Biology for Biotechnology	
BIOL 6300	Biochemistry	
BIOL 6301	Molecular Cell Biology	
BIOL 6303	Neurobiology and Behavior	
BIOT 5120	Foundations in Biotechnology	
BIOT 5145	Biotechnology Lab Skills	
BIOT 5219	The Biotechnology Enterprise	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 7245	Biotechnology Applications Laboratory	
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	
CHEM 5617	Protein Mass Spectrometry Laboratory	
CHEM 5620	Protein Chemistry	
CS 5010	Programming Design Paradigm	

CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5800	Algorithms
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
MATH 5131	Introduction to Mathematical Methods and Modeling
MATH 7203	Numerical Analysis 1
MATH 7205	Numerical Analysis 2
MATH 7233	Graph Theory
MATH 7241	Probability 1
MATH 7340	Statistics for Bioinformatics
MATH 7341	Probability 2
MATH 7342	Mathematical Statistics
MATH 7344	Regression, ANOVA, and Design
PHSC 6214	Experimental Design and Biostatistics
PHYS 5116	Network Science 1
PHYS 7332	Network Science Data 2

Program Credit/GPA Requirements

15–16 total semester hours required

Minimum 3.000 GPA required

Omics, Graduate Certificate (Boston)

Students will explore in detail the key genomic technologies and computational approaches that are driving advances in prognostics, diagnostics, and treatment, learning how scientists sequence, assemble, and analyze the function and structure of genomes. The certificate explores methods for determining traits and diseases by studying the larger population, as well as how gene identification can help identify targets for therapeutic intervention. Students that are already in the field or have an interest in the field will significantly benefit from this curriculum.

Program Requirements

Code	Title	Hours
Required Courses		
BINF 6310	Introduction to Bioinformatics	4
BINF 6400	Genomics in Bioinformatics	4
BINF 6420	Omics in Bioinformatics	4
BINF 6430	Transcriptomics in Bioinformatics	4

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Chemistry and Chemical Biology

Website (<https://cos.northeastern.edu/chemistry-chemical-biology/>)

Penny Beuning, PhD

Professor and Chair

617.373.2822

The PhD program in chemistry provides research and professional opportunities for students that are based on fundamental chemical principles with translational applications to the real world. The program is built on academic rigor and research impact, based on the creativity and strengths of an increasingly diverse faculty and student body. We have harnessed our extensive connections in industry to create and maintain a thriving industry-entry PhD program and provide our regular PhD students with internship opportunities in industry, government laboratories, and other venues that may lead to a wide range of careers. Students in our program leave with flexible skills that can be applied in creative and meaningful ways in academics, industry, and beyond. We are aligned in our core values with the mission of Northeastern University to “educate students for a life of fulfillment and accomplishments and create and translate knowledge to meet global and societal needs.” This mission is at the core of the curriculum, research, mentoring strategies, and professional development opportunities offered to our students. It is implemented in a highly multidisciplinary and transparent environment where students have a voice and take real ownership and responsibility for their professional success. Within this context, PhD students work with chemistry and chemical biology faculty in interdisciplinary areas that include biochemistry and chemical biology, synthetic chemistry, medicinal chemistry, polymer and materials chemistry, environmental chemistry, computational chemistry, and bioanalytical chemistry.

The Master of Science in Chemistry is designed to allow practicing chemical professionals who have an earned bachelor’s degree in chemistry or a closely related field to pursue a master’s degree in chemistry by completing a coursework program during the evening weekday hours. Full-time or part-time options are available. The department offers a diverse range of courses that mirror the faculty’s research interests in biochemistry, chemical biology, synthetic chemistry, medicinal chemistry, polymer and materials chemistry, environmental chemistry, computational chemistry, and bioanalytical chemistry.

Website (<https://cos.northeastern.edu/master-of-science-in-biotechnology/>)

Jocelyn Haversat, PhD

Associate Teaching Professor and Director, Biotechnology Programs

617.373.6998

The biotechnology programs are housed in the Department of Chemistry and Chemical Biology. The Master of Science in Biotechnology, a professional science master’s degree program, is an innovative, nonthesis, experiential graduate degree. It combines advanced interdisciplinary training in biotechnology, biology, chemistry, regulatory, and pharmaceutical sciences with the development of high-value business skills critical to success in the biotechnology industry. Students develop and apply their skills in a hands-on co-op experience with one of Northeastern’s many academic and industry partners. Full-time, part-time, and remote options are available with online and evening course offerings.

The biotechnology program also offers several graduate certificates in the areas of biodefense and biosecurity, biopharmaceutical analytical sciences, biotechnology, biotechnology enterprise, biotechnology regulatory science, experimental biotechnology, manufacturing and quality operations, molecular biotechnology, pharmaceutical technologies, process science, and vaccine development.

Programs

Doctor of Philosophy (PhD)

- Chemistry (Boston) (p. 1141)

Master of Science (MS)

- Biotechnology (Boston) (p. 1142)
- Biotechnology (Oakland) (p. 1147)
- Biotechnology (Portland) (p. 1150)
- Biotechnology (Toronto) (p. 1154)
- Chemistry (Boston) (p. 1157)

Graduate Certificate

- Biodefense and Biosecurity (Boston) (p. 1159)
- Biopharmaceutical Analytical Sciences (Boston) (p. 1160)
- Biotechnology (Boston) (p. 1160)
- Biotechnology (Portland) (p. 1160)
- Biotechnology Enterprise (Boston) (p. 1161)
- Biotechnology Regulatory Science (Boston) (p. 1161)
- Experimental Biotechnology (Boston) (p. 1162)

- Manufacturing and Quality Operations in Biotechnology (Boston) (p. 1162)
- Molecular Biotechnology (Boston) (p. 1162)
- Molecular Biotechnology (Portland) (p. 1163)
- Pharmaceutical Technologies (Boston) (p. 1163)
- Process Science (Boston) (p. 1164)
- Vaccine Development (Boston) (p. 1164)

Chemistry, PhD (Boston)

The PhD program in chemistry is designed for students who have earned a bachelor's or a master's degree in chemistry or related areas and who wish to earn a doctorate in chemistry. Research spans a wide range of multidisciplinary fields, with strengths in clean energy, polymers, materials, medicinal chemistry, bioanalytical chemistry, and chemical biology. Our research programs draw from a strong foundation in analytical, organic, physical, and biological chemistry in a collaborative and diverse environment. Our student-focused approach to mentoring, a strong graduate student association, and faculty deeply rooted both in academics and industry provide a flexible platform for student development toward a large diversity of career paths.

Students typically take courses their first year while supported on teaching assistantships and achieve PhD candidacy in the second year. The primary emphasis of the program is on the completion of an original research project, its articulation in a well-written thesis, and its subsequent defense before the thesis committee through an open seminar followed by oral examination by the committee members.

PhD Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Three qualifying examinations
Annual review
Candidacy
Minimum of two seminars
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
Required Core		
CHEM 5600	Research Skills and Ethics in Chemistry	3
CHEM 7710	Laboratory Rotations in Chemistry and Chemical Biology	0
CHEM 7750	Advanced Problem Solving	3
Complete the following (repeatable) course three times:		3
CHEM 5501	Chemical Safety in the Research Laboratory	
Seminar		
At least one seminar must be taken for a letter grade.		
CHEM 8504	Graduate Seminar	1
Research		
CHEM 8984	Research	1-6
Chemistry		
Complete 18 semester hours from the following:		18
CHEM 5550 or within the range of CHEM 5610 to CHEM 7320		

Dissertation

Code	Title	Hours
Complete the following courses:		
CHEM 9990	Dissertation Term 1	
CHEM 9991	Dissertation Term 2	
Registration in the following course is required for any additional terms taken to complete the dissertation.		
CHEM 9996	Dissertation Continuation	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements

Advanced entry into the PhD program requires a master's degree in chemistry or a related area. Graduate courses taken during acquisition of the Master of Science degree allow completion of the PhD program with fewer course credits. Other than the course requirements, which are specified separately, see the PhD program requirements for details.

INDUSTRY ENTRY PHD

This program is strictly for students who already have a master's degree in chemistry or related area and have full-time employment at a company. The company must commit to all financial responsibilities accrued in obtaining the degree and allow time for the student to work on a PhD thesis in collaborative research with a company supervisor and one of our faculty members. Graduate courses in the Department of Chemistry and Chemical Biology are generally taught in the evenings to accommodate the fact that our students work in industry during the day.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Three qualifying examinations

Annual review

Candidacy

Minimum of two seminars

Dissertation committee

Dissertation proposal

Dissertation defense

Core Requirements

Code	Title	Hours
Required Core		
CHEM 5600	Research Skills and Ethics in Chemistry	3
CHEM 7750	Advanced Problem Solving	3
Seminar		
CHEM 8504	Graduate Seminar	1

Dissertation

Code	Title	Hours
CHEM 9990	Dissertation Term 1	
CHEM 9991	Dissertation Term 2	

Program Credit/GPA Requirements

7 total semester hours required

Minimum 3.000 GPA required

Biotechnology, MS (Boston)

Overview

Northeastern's Master of Science in Biotechnology is a professional master's program, an innovative, nonthesis graduate degree. It combines advanced interdisciplinary training in biotechnology, biology, chemistry, and pharmaceutical sciences with the development of high-value business skills critical to success in today's dynamic workplace. This program is designed to prepare graduates to innovate, collaborate, and lead as research, managerial, or technical professionals in a wide range of biotechnology specialties. The two-year program offers students the possibility to pursue one of ten concentrations to further their knowledge in a specific topical area of the field.

Concentrations

AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

The agricultural concentration goes beyond the production of biological drugs and focuses on the key agricultural biotechnology (agritech) principles and methods used today. Students have an opportunity to learn the principles of agritech and the role they play in the concepts and fundamentals of agriculture today. The concentration addresses plant, animal, food, and ecological biotechnology. The learning of the students is reinforced by both lecture courses and project-driven laboratory experience that provides hands-on learning of modern agricultural methodologies.

BIODEFENSE CONCENTRATION

The biodefense concentration is designed to prepare students for the initial homeland biodefense and bioterrorism response. Students have an opportunity to learn the microbiology and epidemiology of biological agents that are potential threats, identify and propose countermeasures, and

develop expertise in response and recovery strategies and policies. The learning combines the foundational biotechnology courses with case-based and hands-on bioethical, biowarfare, and bioterrorism courses.

BIOPHARMACEUTICAL TECHNOLOGIES AND ANALYTICS CONCENTRATION

The biopharmaceutical technologies and analytics track focuses on structures, variants and activities of biological molecules as well as how to convert purified proteins to biopharmaceutical drug products that are compatible for clinical use. Students learn the diversity of molecular forms derived from biological products, techniques to analyze and characterize these forms, and the impact of these structural changes on the safety and efficacy of biopharmaceuticals. The track addresses design of product formulation, development and implementation of drug product manufacturing processes, and relevant process technology, such as aseptic operations and freeze-drying, needed for drug product manufacturing. This is accomplished through both lecture courses and project-driven laboratory experiences that utilize analytical techniques and provide hands-on learning of formulation design and drug product process development.

BIOTECHNOLOGY OPERATIONS CONCENTRATION

The biotechnology operations track is an operationally inclusive concentration that offers relevant insights to the inner workings of a biotech company while preparing students for new entry or promotions to a variety of biotech functions. Students learn the principles of quality, regulatory science, process science and manufacturing, while integrating business and management skills with the science of biotechnology. The track covers the science behind compliance and the principles and practices of state-of-the-art biopharmaceutical manufacturing and quality operations, enabling students to move across positions in discovery, clinical operations, manufacturing, quality, regulatory affairs, and consulting for operations and operational strategy and/or remediations.

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

MASTER'S DEGREE IN BIOTECHNOLOGY WITH GRADUATE CERTIFICATE IN ENGINEERING LEADERSHIP

Students may complete a Master of Science in Biotechnology in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The certificate program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership, 6 semester hours of the certificate coursework may be applied to the general elective requirement of this program and to the elective requirement of any concentration.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
BIOT 5120	Foundations in Biotechnology	3
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5401	Scientific Communication and Problem Solving in Biotechnology	3
BIOT 5621	Protein Principles in Biotechnology	3
BIOT 5630	Cell Culture Applications for Biopharmaceuticals	2
BIOT 5750	Molecular Approaches in Biotechnology	3
BIOT 6214	Experimental Design and Biostatistics	2
BIOT 7245	Biotechnology Applications Laboratory	3
EESC 6500	Pathways to Professional Success	1
Electives		
Complete 3 semester hours based on lab skills placement test results:		3
Option A (Student exempted from basic lab skills instruction due to placement test results)		
Complete 3 semester hours from the Electives list. (p. 1145)		
Option B (Student requires lab skills instruction)		
BIOT 5145	Biotechnology Lab Skills	
Complete 2 semester hours from the Electives list. (p. 1145)		

Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Agricultural Biotechnology (p. 1144)
- Biodefense (p. 1144)
- Biopharmaceutical Technologies and Analytics (p. 1144)
- Biotechnology Operations (p. 1145)
- Electives Option (p. 1145)

Optional Co-op Experience

Code	Title	Hours
BIOT 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

34 total semester hours required

Minimum 3.000 GPA required

AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

Code	Title	Hours
Required		
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 6100	Agricultural Biotechnology	3
Elective		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		3
BIOT 5850	Higher-Order Structure Analytics	
BIOT 5225	Managing and Leading a Biotechnology Company	
ENVR 5150	Climate and Atmospheric Change	
ENVR 5190	Soil Science	
ENVR 5210	Environmental Planning	
ENVR 5350	Sustainable Energy and Climate Solutions	
ENVR 5670	Global Biogeochemistry	
ENVR 5800	Climate Adaptation and Nature-Based Solutions	
ENVR 6150	Food Security and Sustainability	

BIODEFENSE CONCENTRATION

Code	Title	Hours
Required		
BIOT 6600	Agents of Bioterrorism	3
BIOT 6610	Biosecurity and Bioterrorism	3
Elective		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		3
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
PPUA 6532	Building Resilience into Local Government	
PHTH 5230	Global Health	
PHTH 5202	Introduction to Epidemiology	
PHTH 5212	Public Health Administration and Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	

BIOPHARMACEUTICAL TECHNOLOGIES AND ANALYTICS CONCENTRATION

Code	Title	Hours
Required		
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
Elective		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		3
BIOT 6320	Design and Development of Biopharmaceuticals	
BIOT 5910	Vaccines and Immunization	
BIOT 5930	Molecular Tools for Vaccine Design	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 5225	Managing and Leading a Biotechnology Company	
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	
CHEM 5617	Protein Mass Spectrometry Laboratory	

BIOTECHNOLOGY OPERATIONS CONCENTRATION

Code	Title	Hours
Required		
BIOT 6320	Design and Development of Biopharmaceuticals	3
BIOT 6290	Foundation in Quality for Biotechnology	3
Elective		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		3
<i>Process Sciences Focus</i>		
BIOT 5560	Bioprocess Fundamentals	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
<i>Manufacturing Quality Operations Focus</i>		
BIOT 6300	Pharmaceutical Microbiology	
BIOT 6340	Sterile Manufacturing Operations	
BIOT 5330	Drug Safety and Immunogenicity	
<i>Regulatory Science Focus</i>		
BIOT 5340	Introduction to Biotherapeutic Approvals	
BIOT 5500	Concepts in Regulatory Science	
<i>Enterprise Focus</i>		
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5228	Planning and Executing Biotechnology Projects	

ELECTIVES OPTION

Code	Title	Hours
Complete 9 semester hours from the Electives list. (p. 1145)		9

Electives List

Code	Title	Hours
Electives not on this list may be taken with academic advisor approval.		
BINF 6200	Bioinformatics Programming	
BINF 6310	Introduction to Bioinformatics	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5573	Medical Microbiology	
BIOL 5583	Immunology	
BIOL 5587	Comparative Neurobiology	
BIOL 5591	Advanced Genomics	
BIOL 5597	Immunotherapies of Cancer and Infectious Disease	
BIOL 6381	Ethics in Biological Research	
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	
BIOT 5228	Planning and Executing Biotechnology Projects	
BIOT 5330	Drug Safety and Immunogenicity	
BIOT 5340	Introduction to Biotherapeutic Approvals	
BIOT 5500	Concepts in Regulatory Science	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 5910	Vaccines and Immunization	

BIOT 5920	Foundations in Vaccine Regulatory Science
BIOT 5930	Molecular Tools for Vaccine Design
BIOT 5976	Directed Study
BIOT 6100	Agricultural Biotechnology
BIOT 6300	Pharmaceutical Microbiology
BIOT 6310	CGMP Statutes and Regulation
BIOT 6320	Design and Development of Biopharmaceuticals
BIOT 6340	Sterile Manufacturing Operations
BIOT 6600	Agents of Bioterrorism
BIOT 6610	Biosecurity and Bioterrorism
BIOT 7001	Managing Innovation in Biotechnology
BIOT 7983	Special Topics in Biotechnology
Any 1 SH course from BUSN 5000 to BUSN 7999 (https://catalog.northeastern.edu/course-descriptions/busn/)	
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis
CHEM 5617	Protein Mass Spectrometry Laboratory
CHEM 5621	Principles of Chemical Biology
CHEM 5625	Chemistry and Design of Protein Pharmaceuticals
CHEM 5638	Molecular Modeling
CHME 7340	Chemical Engineering Kinetics
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
EMGT 5220	Engineering Project Management
ENTR 6210	Managing Operations in Early Stage Ventures
ENTR 6211	Entrepreneurship: Services and Retail Business Creation
ENTR 6212	Business Planning for New Ventures
ENTR 6241	Entrepreneurial Marketing and Selling
ENTR 6250	Lean Design and Development
ENVR 6102	Environmental Science and Policy Seminar 2
HINF 5105	The American Healthcare System
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management
INNO 6200	Enterprise Growth and Innovation
INNO 6225	Acquisitions, Alliances, and Growth
INSH 5301	Introduction to Computational Statistics
INTB 6200	Managing the Global Enterprise
INTB 6212	Cultural Aspects of International Business
MECN 6205	Sustainability and the Economics of Markets
MGMT 6225	Sustainability and Leadership
MGSC 6200	Information Analysis
MGSC 6204	Managing Information Resources
NNMD 5270	Foundations in Nanomedicine: Therapeutics
NNMD 5271	Foundations in Nanomedicine: Diagnostics
NNMD 5272	Nanomedicine Seminar
NNMD 5370	Nanomedicine Research Techniques
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
NNMD 5570	Preclinical and Clinical Study Design
PHSC 5212	Research Skills and Ethics
PHSC 5300	Pharmaceutical Biochemistry
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies
PHSC 5560	Nanotoxicity
PHSC 6224	Behavioral Pharmacology and Drug Discovery
PHSC 6290	Biophysical Methods in Drug Discovery
PHSC 7010	Pharmaceutical Sciences Laboratory
PHTH 5320	Grant Writing in Public Health
POLS 7341	Security and Resilience Policy

POLS 7346	Resilient Cities
POLS 7343	Counterterrorism
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 6532	Building Resilience into Local Government
SCHM 6201	Operations and Supply Chain Management
SCHM 6214	Sourcing and Procurement
STRT 6200	Strategic Decision Making in a Changing Environment

Biotechnology, MS (Oakland)

Northeastern's Master of Science in Biotechnology is a professional master's program, an innovative, nonthesis graduate degree. It combines advanced interdisciplinary training in biotechnology, biology, chemistry, and pharmaceutical sciences with the development of high-value business skills critical to success in today's dynamic workplace. This program is designed to prepare graduates to innovate, collaborate, and lead as research, managerial, or technical professionals in a wide range of biotechnology specialties. The two-year program offers students the possibility to pursue one of ten concentrations to further their knowledge in a specific topical area of the field.

Concentrations

AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

The agricultural concentration goes beyond the production of biological drugs and focuses on the key agricultural biotechnology (agritech) principles and methods used today. Students have an opportunity to learn the principles of agritech and the role they play in the concepts and fundamentals of agriculture today. The concentration addresses plant, animal, food, and ecological biotechnology. The learning of the students is reinforced by both lecture courses and project-driven laboratory experience that provides hands-on learning of modern agricultural methodologies.

BIODEFENSE CONCENTRATION

The biodefense concentration is designed to prepare students for the initial homeland biodefense and bioterrorism response. Students have an opportunity to learn the microbiology and epidemiology of biological agents that are potential threats, identify and propose countermeasures, and develop expertise in response and recovery strategies and policies. The learning combines the foundational biotechnology courses with case-based and hands-on bioethical, biowarfare, and bioterrorism courses.

BIOPHARMACEUTICAL TECHNOLOGIES AND ANALYTICS CONCENTRATION

The biopharmaceutical technologies and analytics track focuses on structures, variants and activities of biological molecules as well as how to convert purified proteins to biopharmaceutical drug products that are compatible for clinical use. Students learn the diversity of molecular forms derived from biological products, techniques to analyze and characterize these forms, and the impact of these structural changes on the safety and efficacy of biopharmaceuticals. The track addresses design of product formulation, development and implementation of drug product manufacturing processes, and relevant process technology, such as aseptic operations and freeze-drying, needed for drug product manufacturing. This is accomplished through both lecture courses and project-driven laboratory experiences that utilize analytical techniques and provide hands-on learning of formulation design and drug product process development.

BIOTECHNOLOGY OPERATIONS CONCENTRATION

The biotechnology operations track is an operationally inclusive concentration that offers relevant insights to the inner workings of a biotech company while preparing students for new entry or promotions to a variety of biotech functions. Students learn the principles of quality, regulatory science, process science and manufacturing, while integrating business and management skills with the science of biotechnology. The track covers the science behind compliance and the principles and practices of state-of-the-art biopharmaceutical manufacturing and quality operations, enabling students to move across positions in discovery, clinical operations, manufacturing, quality, regulatory affairs, and consulting for operations and operational strategy and/or remediations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
BIOT 5120	Foundations in Biotechnology	3
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5401	Scientific Communication and Problem Solving in Biotechnology	3
BIOT 5621	Protein Principles in Biotechnology	3
BIOT 5630	Cell Culture Applications for Biopharmaceuticals	2
BIOT 5750	Molecular Approaches in Biotechnology	3
BIOT 6214	Experimental Design and Biostatistics	2

1148 Biotechnology, MS (Oakland)

BIOT 7245	Biotechnology Applications Laboratory	3
EESC 6500	Pathways to Professional Success	1
Electives		
Complete 3 semester hours based on lab skills placement test results:		3
Option A (Student exempted from basic lab skills instruction due to placement test results)		
Complete 3 semester hours from the Electives list. (p. 1149)		
Option B (Student requires lab skills instruction)		
BIOT 5145	Biotechnology Lab Skills	
Complete 2 semester hours from the Electives list. (p. 1149)		

Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Agricultural Biotechnology (p. 1148)
- Biodefense (p. 1148)
- Biopharmaceutical Technologies and Analytics (p. 1148)
- Biotechnology Operations (p. 1149)
- Electives Option (p. 1149)

Optional Co-op Experience

Code	Title	Hours
BIOT 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

34 total semester hours required

Minimum 3.000 GPA required

AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

Code	Title	Hours
Required		
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 6100	Agricultural Biotechnology	3
Elective		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		3
BIOT 5850	Higher-Order Structure Analytics	
BIOT 5225	Managing and Leading a Biotechnology Company	

BIODEFENSE CONCENTRATION

Code	Title	Hours
Required		
BIOT 6600	Agents of Bioterrorism	3
BIOT 6610	Biosecurity and Bioterrorism	3
Elective		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		3
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
PHTH 5202	Introduction to Epidemiology	
PHTH 5212	Public Health Administration and Policy	

BIOPHARMACEUTICAL TECHNOLOGIES AND ANALYTICS

Code	Title	Hours
Required		
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
Elective		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		3
BIOT 6320	Design and Development of Biopharmaceuticals	

BIOT 5910	Vaccines and Immunization
BIOT 5930	Molecular Tools for Vaccine Design
BIOT 5850	Higher-Order Structure Analytics
BIOT 5225	Managing and Leading a Biotechnology Company
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis

BIOTECHNOLOGY OPERATIONS

Code	Title	Hours
Required		
BIOT 6320	Design and Development of Biopharmaceuticals	3
BIOT 6290	Foundation in Quality for Biotechnology	3
Elective		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		3
<i>Enterprise Focus</i>		
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5228	Planning and Executing Biotechnology Projects	
<i>Manufacturing Quality Operations Focus</i>		
BIOT 6300	Pharmaceutical Microbiology	
BIOT 6340	Sterile Manufacturing Operations	
BIOT 5330	Drug Safety and Immunogenicity	
<i>Process Sciences Focus</i>		
BIOT 5560	Bioprocess Fundamentals	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
<i>Regulatory Science Focus</i>		
BIOT 5340	Introduction to Biotherapeutic Approvals	
BIOT 5500	Concepts in Regulatory Science	

ELECTIVES OPTION

Code	Title	Hours
Complete 9 semester hours from the Electives list. (p. 1149)		9

Electives List

Code	Title	Hours
Electives not on this list may be taken with academic advisor approval.		
BINF 6200	Bioinformatics Programming	
BINF 6310	Introduction to Bioinformatics	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5583	Immunology	
BIOL 6381	Ethics in Biological Research	
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	
BIOT 5228	Planning and Executing Biotechnology Projects	
BIOT 5330	Drug Safety and Immunogenicity	
BIOT 5340	Introduction to Biotherapeutic Approvals	
BIOT 5500	Concepts in Regulatory Science	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 5910	Vaccines and Immunization	
BIOT 5920	Foundations in Vaccine Regulatory Science	

BIOT 5930	Molecular Tools for Vaccine Design
BIOT 5976	Directed Study
BIOT 6100	Agricultural Biotechnology
BIOT 6300	Pharmaceutical Microbiology
BIOT 6310	CGMP Statutes and Regulation
BIOT 6320	Design and Development of Biopharmaceuticals
BIOT 6340	Sterile Manufacturing Operations
BIOT 6600	Agents of Bioterrorism
BIOT 6610	Biosecurity and Bioterrorism
BIOT 7001	Managing Innovation in Biotechnology
BIOT 7983	Special Topics in Biotechnology
Any 1 SH course from BUSN 5000 to BUSN 7999 (https://catalog.northeastern.edu/course-descriptions/busn/)	
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
EMGT 5220	Engineering Project Management
ENTR 6210	Managing Operations in Early Stage Ventures
ENTR 6211	Entrepreneurship: Services and Retail Business Creation
ENTR 6250	Lean Design and Development
HINF 5105	The American Healthcare System
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management
INNO 6200	Enterprise Growth and Innovation
INNO 6225	Acquisitions, Alliances, and Growth
INSH 5301	Introduction to Computational Statistics
INTB 6212	Cultural Aspects of International Business
MECN 6205	Sustainability and the Economics of Markets
NNMD 5270	Foundations in Nanomedicine: Therapeutics
NNMD 5271	Foundations in Nanomedicine: Diagnostics
NNMD 5272	Nanomedicine Seminar
NNMD 5370	Nanomedicine Research Techniques
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
NNMD 5570	Preclinical and Clinical Study Design
PHSC 5212	Research Skills and Ethics
PHTH 5320	Grant Writing in Public Health
POLS 7341	Security and Resilience Policy
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy

Biotechnology, MS (Portland)

Northeastern's Master of Science in Biotechnology is a professional master's program, an innovative, nonthesis graduate degree. It combines advanced interdisciplinary training in biotechnology, biology, chemistry, and pharmaceutical sciences with the development of high-value business skills critical to success in today's dynamic workplace. This program is designed to prepare graduates to innovate, collaborate, and lead as research, managerial, or technical professionals in a wide range of biotechnology specialties. The two-year program offers students the possibility to pursue one of ten concentrations to further their knowledge in a specific topical area of the field.

Concentrations

AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

The agricultural concentration goes beyond the production of biological drugs and focuses on the key agricultural biotechnology (agritech) principles and methods used today. Students have an opportunity to learn the principles of agritech and the role they play in the concepts and fundamentals of agriculture today. The concentration addresses plant, animal, food, and ecological biotechnology. The learning of the students is reinforced by both lecture courses and project-driven laboratory experience that provides hands-on learning of modern agricultural methodologies.

BIODEFENSE CONCENTRATION

The biodefense concentration is designed to prepare students for the initial homeland biodefense and bioterrorism response. Students have an opportunity to learn the microbiology and epidemiology of biological agents that are potential threats, identify and propose countermeasures, and

develop expertise in response and recovery strategies and policies. The learning combines the foundational biotechnology courses with case-based and hands-on bioethical, biowarfare, and bioterrorism courses.

BIOPHARMACEUTICAL TECHNOLOGIES AND ANALYTICS CONCENTRATION

The biopharmaceutical technologies and analytics track focuses on structures, variants and activities of biological molecules as well as how to convert purified proteins to biopharmaceutical drug products that are compatible for clinical use. Students learn the diversity of molecular forms derived from biological products, techniques to analyze and characterize these forms, and the impact of these structural changes on the safety and efficacy of biopharmaceuticals. The track addresses design of product formulation, development and implementation of drug product manufacturing processes, and relevant process technology, such as aseptic operations and freeze-drying, needed for drug product manufacturing. This is accomplished through both lecture courses and project-driven laboratory experiences that utilize analytical techniques and provide hands-on learning of formulation design and drug product process development.

BIOTECHNOLOGY OPERATIONS CONCENTRATION

The biotechnology operations track is an operationally inclusive concentration that offers relevant insights to the inner workings of a biotech company while preparing students for new entry or promotions to a variety of biotech functions. Students learn the principles of quality, regulatory science, process science and manufacturing, while integrating business and management skills with the science of biotechnology. The track covers the science behind compliance and the principles and practices of state-of-the-art biopharmaceutical manufacturing and quality operations, enabling students to move across positions in discovery, clinical operations, manufacturing, quality, regulatory affairs, and consulting for operations and operational strategy and/or remediations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
BIOT 5120	Foundations in Biotechnology	3
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5401	Scientific Communication and Problem Solving in Biotechnology	3
BIOT 5621	Protein Principles in Biotechnology	3
BIOT 5630	Cell Culture Applications for Biopharmaceuticals	2
BIOT 5750	Molecular Approaches in Biotechnology	3
BIOT 6214	Experimental Design and Biostatistics	2
BIOT 7246	Molecular Technologies Practicum	3
EESC 6500	Pathways to Professional Success	1

Electives

Complete 3 semester hours based on lab skills placement test results:		3
Option A (Student exempted from basic lab skills instruction due to placement test results)		
Complete 3 semester hours from the Electives list. (p. 1153)		
Option B (Student requires lab skills instruction)		
BIOT 5145	Biotechnology Lab Skills	
Complete 2 semester hours from the Electives list. (p. 1153)		

Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Agricultural Biotechnology (p. 1152)
- Biodefense (p. 1152)
- Biopharmaceutical Technologies and Analytics (p. 1152)
- Biotechnology Operations (p. 1152)
- Electives Option (p. 1153)

Optional Co-op Experience

Code	Title	Hours
BIOT 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

34 total semester hours required

Minimum 3.000 GPA required

AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

Code	Title	Hours
Required		
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 6100	Agricultural Biotechnology	3
Elective		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		3
BIOT 5850	Higher-Order Structure Analytics	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 7247	Advanced Molecular Techniques in Microbial and Gene Expression Analysis	

BIODEFENSE CONCENTRATION

Code	Title	Hours
Required		
BIOT 6600	Agents of Bioterrorism	3
BIOT 6610	Biosecurity and Bioterrorism	3
Elective		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		3
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
PHTH 5202	Introduction to Epidemiology	
PHTH 5212	Public Health Administration and Policy	

BIOPHARMACEUTICAL TECHNOLOGIES AND ANALYTICS

Code	Title	Hours
Required		
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
Elective		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		3
BIOT 6320	Design and Development of Biopharmaceuticals	
BIOT 5910	Vaccines and Immunization	
BIOT 5930	Molecular Tools for Vaccine Design	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 7247	Advanced Molecular Techniques in Microbial and Gene Expression Analysis	
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	

BIOTECHNOLOGY OPERATIONS

Code	Title	Hours
Required		
BIOT 6320	Design and Development of Biopharmaceuticals	3
BIOT 6290	Foundation in Quality for Biotechnology	3
Elective		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		3
<i>Enterprise Focus</i>		
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5228	Planning and Executing Biotechnology Projects	
<i>Manufacturing Quality Operations Focus</i>		
BIOT 5330	Drug Safety and Immunogenicity	
BIOT 6300	Pharmaceutical Microbiology	
BIOT 6340	Sterile Manufacturing Operations	
<i>Process Sciences Focus</i>		
BIOT 5560	Bioprocess Fundamentals	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	

Regulatory Science Focus

BIOT 5340	Introduction to Biotherapeutic Approvals
BIOT 5500	Concepts in Regulatory Science

ELECTIVES OPTION

Code	Title	Hours
Complete 9 semester hours from the Electives list. (p. 1153)		9

Electives List

Code	Title	Hours

Electives not on this list may be taken with academic advisor approval.

BINF 6200	Bioinformatics Programming	
BINF 6310	Introduction to Bioinformatics	
BINF 6511	Using Real-World Data to Advance Discovery in the Fields of Bioinformatics and Biotechnology	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5583	Immunology	
BIOL 6381	Ethics in Biological Research	
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	
BIOT 5228	Planning and Executing Biotechnology Projects	
BIOT 5330	Drug Safety and Immunogenicity	
BIOT 5340	Introduction to Biotherapeutic Approvals	
BIOT 5500	Concepts in Regulatory Science	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 5910	Vaccines and Immunization	
BIOT 5920	Foundations in Vaccine Regulatory Science	
BIOT 5930	Molecular Tools for Vaccine Design	
BIOT 5976	Directed Study	
BIOT 6100	Agricultural Biotechnology	
BIOT 6300	Pharmaceutical Microbiology	
BIOT 6310	CGMP Statutes and Regulation	
BIOT 6320	Design and Development of Biopharmaceuticals	
BIOT 6340	Sterile Manufacturing Operations	
BIOT 6600	Agents of Bioterrorism	
BIOT 6610	Biosecurity and Bioterrorism	
BIOT 7001	Managing Innovation in Biotechnology	
BIOT 7247	Advanced Molecular Techniques in Microbial and Gene Expression Analysis	
BIOT 7983	Special Topics in Biotechnology	
Any 1 SH course from BUSN 5000 to BUSN 7999 (https://catalog.northeastern.edu/course-descriptions/busn/)		
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
EMGT 5220	Engineering Project Management	
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6211	Entrepreneurship: Services and Retail Business Creation	
ENTR 6250	Lean Design and Development	
HINF 5105	The American Healthcare System	

HINF 6201	Organizational Behavior, Work Flow Design, and Change Management
INNO 6200	Enterprise Growth and Innovation
INNO 6225	Acquisitions, Alliances, and Growth
INSH 5301	Introduction to Computational Statistics
INTB 6212	Cultural Aspects of International Business
MECN 6205	Sustainability and the Economics of Markets
NNMD 5270	Foundations in Nanomedicine: Therapeutics
NNMD 5271	Foundations in Nanomedicine: Diagnostics
NNMD 5272	Nanomedicine Seminar
NNMD 5370	Nanomedicine Research Techniques
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
NNMD 5570	Preclinical and Clinical Study Design
PHSC 5212	Research Skills and Ethics
PHSC 5300	Pharmaceutical Biochemistry
PHTH 5320	Grant Writing in Public Health
POLS 7341	Security and Resilience Policy
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy

Biotechnology, MS (Toronto)

Northeastern's Master of Science in Biotechnology is a professional master's program, an innovative, nonthesis graduate degree. This program is designed to prepare graduates to innovate, collaborate, and lead as research, managerial, or technical professionals in a wide range of biotechnology specialties. The two-year program offers students the possibility to pursue concentrations to further their knowledge in a specific topical area of the field.

Concentrations

AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

The agricultural concentration goes beyond the production of biological drugs and focuses on the key agricultural biotechnology (agritech) principles and methods used today. Students have an opportunity to learn the principles of agritech and the role they play in the concepts and fundamentals of agriculture today. The concentration addresses plant, animal, food, and ecological biotechnology. The learning of the students is reinforced by both lecture courses and project-driven laboratory experience that provides hands-on learning of modern agricultural methodologies.

BIODEFENSE CONCENTRATION

The biodefense concentration is designed to prepare students for the initial homeland biodefense and bioterrorism response. Students have an opportunity to learn the microbiology and epidemiology of biological agents that are potential threats, identify and propose countermeasures, and develop expertise in response and recovery strategies and policies. The learning combines the foundational biotechnology courses with case-based and hands-on bioethical, biowarfare, and bioterrorism courses.

BIOPHARMACEUTICAL TECHNOLOGIES AND ANALYTICS CONCENTRATION

The biopharmaceutical technologies and analytics track focuses on structures, variants and activities of biological molecules as well as how to convert purified proteins to biopharmaceutical drug products that are compatible for clinical use. Students learn the diversity of molecular forms derived from biological products, techniques to analyze and characterize these forms, and the impact of these structural changes on the safety and efficacy of biopharmaceuticals. The track addresses design of product formulation, development and implementation of drug product manufacturing processes, and relevant process technology, such as aseptic operations and freeze-drying, needed for drug product manufacturing. This is accomplished through both lecture courses and project-driven laboratory experiences that utilize analytical techniques and provide hands-on learning of formulation design and drug product process development.

BIOTECHNOLOGY OPERATIONS CONCENTRATION

The biotechnology operations track is an operationally inclusive concentration that offers relevant insights to the inner workings of a biotech company while preparing students for new entry or promotions to a variety of biotech functions. Students learn the principles of quality, regulatory science, process science and manufacturing, while integrating business and management skills with the science of biotechnology. The track covers the science behind compliance and the principles and practices of state-of-the-art biopharmaceutical manufacturing and quality operations, enabling students to move across positions in discovery, clinical operations, manufacturing, quality, regulatory affairs, and consulting for operations and operational strategy and/or remediations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
BIOT 5120	Foundations in Biotechnology	3
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5401	Scientific Communication and Problem Solving in Biotechnology	3
BIOT 5621	Protein Principles in Biotechnology	3
BIOT 5630	Cell Culture Applications for Biopharmaceuticals	2
BIOT 5750	Molecular Approaches in Biotechnology	3
BIOT 6214	Experimental Design and Biostatistics	2
BIOT 7245	Biotechnology Applications Laboratory	3
Co-op and Experiential Learning		
EESC 6500	Pathways to Professional Success	1
BIOT 7001	Managing Innovation in Biotechnology	3

Concentration or Electives Option

A concentration is not required. Students may complete the Electives Option in lieu of a concentration.

Note: All students will be assessed for lab skills proficiency. Students who need to complete Biotechnology Lab Skills (BIOT 5145) and seek to graduate at 34 total program hours must select the Electives Option. For students who need to complete Biotechnology Lab Skills (BIOT 5145), choosing a concentration will require an additional 1 SH of coursework.

- Agricultural Biotechnology (p. 1155)
- Biodefense (p. 1155)
- Biopharmaceutical Technologies and Analytics (<https://catalog.northeastern.edu/graduate/science/chemistry-chemical-biology/biotechnology-ms/#Biopharmaceutical%20Technologies%20and%20Analytics>)
- Biotechnology Operations (<https://catalog.northeastern.edu/graduate/science/chemistry-chemical-biology/biotechnology-ms/#Biotechnology%20Operations>)
- Electives Option (p. 1155)

Optional Co-op Experience

Code	Title	Hours
BIOT 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

34 total semester hours required (35 total semester hours required for students assessed to need Biotechnology Lab Skills (BIOT 5145) and who choose to declare a concentration)

Minimum 3.000 GPA required

CONCENTRATION IN AGRICULTURAL BIOTECHNOLOGY

Code	Title	Hours
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 6100	Agricultural Biotechnology	3
Choose one from the following:		3
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5850	Higher-Order Structure Analytics	

CONCENTRATION IN BIODEFENSE

Code	Title	Hours
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 6600	Agents of Bioterrorism	3
BIOT 6610	Biosecurity and Bioterrorism	3

CONCENTRATION IN BIOPHARMACEUTICAL TECHNOLOGIES AND ANALYTICS

Code	Title	Hours
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3

Choose one from the following:

3

BIOT 5225	Managing and Leading a Biotechnology Company
BIOT 5910	Vaccines and Immunization
BIOT 5930	Molecular Tools for Vaccine Design
BIOT 5850	Higher-Order Structure Analytics
BIOT 6320	Design and Development of Biopharmaceuticals
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis

CONCENTRATION IN BIOTECHNOLOGY OPERATIONS

Code	Title	Hours
BIOT 6290	Foundation in Quality for Biotechnology	3
BIOT 6320	Design and Development of Biopharmaceuticals	3

Choose one from the following:

3

BIOT 5225	Managing and Leading a Biotechnology Company
BIOT 5228	Planning and Executing Biotechnology Projects
BIOT 5330	Drug Safety and Immunogenicity
BIOT 5340	Introduction to Biotherapeutic Approvals
BIOT 5500	Concepts in Regulatory Science
BIOT 5560	Bioprocess Fundamentals
BIOT 5635	Downstream Processes for Biopharmaceutical Production
BIOT 6300	Pharmaceutical Microbiology
BIOT 6340	Sterile Manufacturing Operations

ELECTIVES OPTION

Code	Title	Hours
Complete at least 9 semester hours from this program's Electives List (p. 1156)		9

Electives List

Code	Title	Hours
BINF 6200	Bioinformatics Programming	
BINF 6310	Introduction to Bioinformatics	
BIOT 5145	Biotechnology Lab Skills	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5228	Planning and Executing Biotechnology Projects	
BIOT 5330	Drug Safety and Immunogenicity	
BIOT 5340	Introduction to Biotherapeutic Approvals	
BIOT 5500	Concepts in Regulatory Science	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 5910	Vaccines and Immunization	
BIOT 5930	Molecular Tools for Vaccine Design	
BIOT 6100	Agricultural Biotechnology	
BIOT 6290	Foundation in Quality for Biotechnology	
BIOT 6300	Pharmaceutical Microbiology	
BIOT 6310	CGMP Statutes and Regulation	
BIOT 6320	Design and Development of Biopharmaceuticals	
BIOT 6340	Sterile Manufacturing Operations	
BIOT 6600	Agents of Bioterrorism	
BIOT 6610	Biosecurity and Bioterrorism	
BIOT 7983	Special Topics in Biotechnology	
BIOE 5430	Principles and Applications of Tissue Engineering	

CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management
INSH 5301	Introduction to Computational Statistics
NNMD 5271	Foundations in Nanomedicine: Diagnostics
NNMD 5272	Nanomedicine Seminar
NNMD 5370	Nanomedicine Research Techniques
PHSC 5212	Research Skills and Ethics
PPUA 5390	Special Topics in Public Policy and Urban Affairs

Chemistry, MS (Boston)

Master's Coursework Option

The Department of Chemistry and Chemical Biology offers a full-time or part-time, course-based master's degree. Classes are generally offered in the evenings to accommodate students who have full-time jobs. A research thesis is not a requirement for the degree.

Master's Thesis Option

A thesis-based master's option is available only by department approval. Students who wish to pursue the thesis option must have a chemistry and chemical biology tenure-track faculty member willing to serve as their faculty advisor.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Concentration or Option

- Analytical Chemistry (p. 1157)
- Chemical Biology (p. 1158)
- Chemical Toxicology and Environmental Chemistry (p. 1158)
- Coursework Option (p. 1159)
- Thesis Option (p. 1159)

OPTIONAL CO-OP EXPERIENCE

Code	Title	Hours
If pursuing a co-op, regardless of concentration or option, the following must be completed:		
CHEM 5621 and CHEM 5622	Principles of Chemical Biology and Lab for CHEM 5621	4
CHEM 5628 and CHEM 5631	Principles of Spectroscopy of Organic Compounds and Lab for CHEM 5628	4
CHEM 5638 or CHEM 5641 or CHEM 5649	Molecular Modeling Computational Chemistry Numerical Strategies and Data Analytics for Chemical Sciences	3
EESC 6400	Pre-co-op Work Experience	0
EESC 6500	Pathways to Professional Success	1

Program Credit/GPA Requirements

30 total semester hours required

Additional hours required for students who opt to participate in co-op

Minimum 3.000 GPA required

ANALYTICAL CHEMISTRY CONCENTRATION

Code	Title	Hours
CHEM 5611	Analytical Separations	3
CHEM 5612	Principles of Mass Spectrometry	3
CHEM 5628	Principles of Spectroscopy of Organic Compounds	3
Complete 21 semester hours as follows.		21

Complete at least one of the following:

CHEM 5614	Electroanalytical Chemistry
CHEM 5642	Photochemistry Fundamentals and Applications
CHEM 5660	Analytical Biochemistry
CHEM 5670	Global Biogeochemistry
CHEM 5688	Principles of Nuclear Magnetic Resonance
Complete remaining coursework from the following range:	
CHEM 5550 to CHEM 7750	

CHEMICAL BIOLOGY CONCENTRATION

Code	Title	Hours
CHEM 5621	Principles of Chemical Biology	3
CHEM 5676	Bioorganic Chemistry	3

Complete 24 semester hours as follows. 24

Complete one of the following:

CHEM 5611	Analytical Separations
CHEM 5612	Principles of Mass Spectrometry
CHEM 5628	Principles of Spectroscopy of Organic Compounds
CHEM 5660	Analytical Biochemistry

Complete at least two of the following:

CHEM 5620	Protein Chemistry
CHEM 5630	Nucleic Acid Chemistry
CHEM 5638	Molecular Modeling
CHEM 5640	Biopolymeric Materials
CHEM 5648	Chemical Principles and Application of Drug Metabolism and Pharmacokinetics
CHEM 5670	Global Biogeochemistry

Complete remaining coursework from the following range:

CHEM 5550 to CHEM 7750

CHEMICAL TOXICOLOGY AND ENVIRONMENTAL CHEMISTRY CONCENTRATION

Code	Title	Hours
CHEM 5611	Analytical Separations	3
CHEM 5621	Principles of Chemical Biology	3
CHEM 5628	Principles of Spectroscopy of Organic Compounds	3
CHEM 5642	Photochemistry Fundamentals and Applications	3

Complete 18 semester hours as follows. 18

Complete at least one of the following:

CHEM 5640	Biopolymeric Materials
CHEM 5643	Plastics Sustainability and Circular Economy: A Chemical Perspective
CHEM 5670	Global Biogeochemistry
CHEM 5692	Carbon Capture, Utilization, and Storage

Complete one of the following:

CHEM 5648	Chemical Principles and Application of Drug Metabolism and Pharmacokinetics
CHEM 5660	Analytical Biochemistry

Complete remaining coursework from the range CHEM 5550 to CHEM 7750 or up to 6 semester hours from the following restricted electives:

CIVE 5250	Organic Pollutants in the Environment
CIVE 5255	Tools and Techniques of Environmental Health
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure
CIVE 5300	Environmental Sampling and Analysis
CIVE 5366	Air Quality Engineering and Science
CIVE 7250	Environmental Chemistry
CIVE 7251	Environmental Biological Processes
CIVE 7255	Environmental Physical/Chemical Processes
CIVE 7279	Advanced Air Quality

ENVR 5350	Sustainable Energy and Climate Solutions
PHSC 5560	Nanotoxicity
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 5214	Environmental Health
PHTH 6208	Foundations of Community Health Assessment
PPUA 5240	Health Policy and Politics
PPUA 5268	International Environmental Policy

COURSEWORK OPTION

Code	Title	Hours
Complete 30 semester hours from the following range:		30
CHEM 5550 to CHEM 7750		

THESIS OPTION

A thesis-based master's option is available only by department approval. Students who wish to pursue the thesis option must have a chemistry and chemical biology tenure-track faculty member willing to serve as their faculty advisor.

Code	Title	Hours
Coursework		
Complete 18 semester hours from the following:		18
CHEM 5550 or any course within the range of CHEM 5610 to CHEM 7320		
Graduate Seminar		
Seminar must be completed twice. At least one seminar must be taken for a letter grade.		2
CHEM 5904	Seminar	
or CHEM 8504	Graduate Seminar	
Laboratory		
Complete the following (repeatable) course twice:		2
CHEM 5501	Chemical Safety in the Research Laboratory	
Research		
CHEM 5984	Research	4-6
or CHEM 8984	Research	
Thesis		
CHEM 7990	Thesis	4

Biodefense and Biosecurity, Graduate Certificate (Boston)

The Graduate Certificate in Biodefense and Biosecurity has been designed in response to a need in the biotechnology industry for individuals who desire to become professionals in biodefense or biosecurity. The concentration seeks to give individuals a background into the technology to detect, analyze, and respond to biosecurity threats. Enrolled students will study the microbiology and epidemiology of biological agents that are potential threats; identify and propose what countermeasures can be used; and through coursework develop expertise in the response, strategies, and policies related to biodefense and biosecurity. The graduate certificate consists of three biotechnology courses and one public policy and urban affairs course totaling 13 semester hours.

Program Requirements**Required Courses**

Code	Title	Hours
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 6610	Biosecurity and Bioterrorism	3
BIOT 6600	Agents of Bioterrorism	3
PPUA 6532	Building Resilience into Local Government	4

Program Credit/GPA Requirements

13 total semester hours required

Minimum 3.000 GPA required

Biopharmaceutical Analytical Sciences, Graduate Certificate (Boston)

The Graduate Certificate in Biopharmaceutical Analytical Sciences has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art analyses of protein with focus on the characterization of innovator and biosimilars. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, have an opportunity to improve their competency and learn new practical skills that enable them to increase productivity and further contribute to their professions. In addition, the certificate was designed for both individuals with and without experience in biopharmaceuticals and their analysis.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 6290	Foundation in Quality for Biotechnology	3
BIOT 6320	Design and Development of Biopharmaceuticals	3
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3
CHEM 5617	Protein Mass Spectrometry Laboratory	3

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Biotechnology, Graduate Certificate (Boston)

The Graduate Certificate in Biotechnology has been designed in response to a need in the biotechnology industry for individuals without a biotechnology background to obtain a strong foundation in basic biotechnology concepts and skills. Individuals, particularly those who are working in fields other than biotechnology, will acquire competency and learn new practical skills enabling them to increase productivity and allow for transitions into more biotechnology-related fields.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5120	Foundations in Biotechnology	3
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	1
BIOT 5621	Protein Principles in Biotechnology	3
BIOT 5630	Cell Culture Applications for Biopharmaceuticals	2
BIOT 5750	Molecular Approaches in Biotechnology	3

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Biotechnology, Graduate Certificate (Portland)

The Graduate Certificate in Biotechnology has been designed in response to a need in the biotechnology industry for individuals without a biotechnology background to obtain a strong foundation in basic biotechnology concepts and skills. Individuals, particularly those who are working in fields other than biotechnology, will acquire competency and learn new practical skills enabling them to increase productivity and allow for transitions into more biotechnology-related fields.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5120	Foundations in Biotechnology	3
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	1

BIOT 5621	Protein Principles in Biotechnology	3
BIOT 5630	Cell Culture Applications for Biopharmaceuticals	2
BIOT 5750	Molecular Approaches in Biotechnology	3

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Biotechnology Enterprise, Graduate Certificate (Boston)

The graduate certificate in biotechnology enterprise has been designed in response to a need in the biotechnology industry for individuals with a biotechnology background to obtain a strong foundation in the business aspects of biotechnology. Individuals, particularly those who are working in the field of biotechnology, will improve their business competency enabling them to better manage a team or move into a more business-orientated role.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
BIOT 5120	Foundations in Biotechnology	3
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	1
BIOT 5225	Managing and Leading a Biotechnology Company	3

Elective

Code	Title	Hours
Complete one elective from the following list:		3
BIOT 5228	Planning and Executing Biotechnology Projects	
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6211	Entrepreneurship: Services and Retail Business Creation	
ENTR 6212	Business Planning for New Ventures	
INTB 6200	Managing the Global Enterprise	
INTB 6212	Cultural Aspects of International Business	
MGSC 6200	Information Analysis	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Biotechnology Regulatory Science, Graduate Certificate (Boston)

This certificate was designed in response to a need in the biotechnology industry for individuals, in particular regulators, to obtain a strong foundation in the science behind good regulatory practice today, specifically in relation to biopharmaceuticals.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5330	Drug Safety and Immunogenicity	3
BIOT 5500	Concepts in Regulatory Science	3
BIOT 5621	Protein Principles in Biotechnology	3
BIOT 6320	Design and Development of Biopharmaceuticals	3
or BIOT 5340	Introduction to Biotherapeutic Approvals	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Experimental Biotechnology, Graduate Certificate (Boston)

The graduate certificate in experimental biotechnology has been designed in response to a need in the biotechnology industry for individuals without a biotechnology background to obtain a strong foundation in lab-based, hands-on, biotechnology skills. Individuals, particularly those who are working in fields other than biotechnology, will acquire competency and learn new practical lab skills enabling them to increase productivity and transition into more biotechnology-related fields.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5145	Biotechnology Lab Skills	1
BIOT 5219	The Biotechnology Enterprise	2
BIOL 5549	Inventions in Microbial Biotechnology	4
BIOT 6214	Experimental Design and Biostatistics	2
BIOT 7245	Biotechnology Applications Laboratory	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Manufacturing and Quality Operations in Biotechnology, Graduate Certificate (Boston)

The graduate certificate in manufacturing and quality operations has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art biopharmaceutical manufacturing and quality operations. In particular, the focus of this certificate is training the workforce to ensure quality medicines are produced. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, have an opportunity to improve their competency and learn new practical skills, which enables them to increase productivity and further contribute to their professions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 6300	Pharmaceutical Microbiology	3
BIOT 6310	CGMP Statutes and Regulation	3
BIOT 6320	Design and Development of Biopharmaceuticals	3
BIOT 6340	Sterile Manufacturing Operations	3

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Molecular Biotechnology, Graduate Certificate (Boston)

The graduate certificate in molecular biotechnology has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art molecular biology techniques and advanced protein structure analysis. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development and manufacturing of biopharmaceuticals, will improve their competency and learn new practical skills enabling them to increase productivity and further contribute to their professions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
BIOT 5750	Molecular Approaches in Biotechnology	3
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 5850	Higher-Order Structure Analytics	3

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Molecular Biotechnology, Graduate Certificate (Portland)

The graduate certificate in molecular biotechnology has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art molecular biology techniques and advanced protein structure analysis. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development and manufacturing of biopharmaceuticals, will improve their competency and learn new practical skills enabling them to increase productivity and further contribute to their professions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
BIOT 5750	Molecular Approaches in Biotechnology	3
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 5850	Higher-Order Structure Analytics	3

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Pharmaceutical Technologies, Graduate Certificate (Boston)

The Graduate Certificate in Pharmaceutical Technologies has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of the stages of drug development, biopharmaceutical development. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, will improve their competency and learn new practical skills enabling them to increase productivity and further contribute to their professions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
BIOT 6320	Design and Development of Biopharmaceuticals	3
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Process Science, Graduate Certificate (Boston)

The graduate certificate in process sciences has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of process development of biopharmaceuticals. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development and manufacturing of biopharmaceuticals, will improve their competency and learn new practical skills enabling them to increase productivity and further contribute to their professions.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5560	Bioprocess Fundamentals	3
BIOT 5635	Downstream Processes for Biopharmaceutical Production	3
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 6320	Design and Development of Biopharmaceuticals	3

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Vaccine Development, Graduate Certificate (Boston)

The SARS-CoV-2 pandemic has reemphasized the importance of vaccines in our medical toolkit to prevent the spread of infectious diseases. The Certificate in Vaccine Development explores what vaccines are, how they work (immunization), how regulatory science has evolved in vaccine approvals, and how vaccines are created. This certificate includes three courses specifically focused on the science of vaccines and two courses focusing on cell culture and good manufacturing practices. Credits earned in this certificate may be used to satisfy requirements in the Master of Science in Biotechnology.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	1
BIOT 5630	Cell Culture Applications for Biopharmaceuticals	2
BIOT 5910	Vaccines and Immunization	3
BIOT 5920	Foundations in Vaccine Regulatory Science	3
BIOT 5930	Molecular Tools for Vaccine Design	3
BIOT 6310	CGMP Statutes and Regulation	3

Program Credit/GPA Requirements

15 total semester hours required

Minimum 3.000 GPA required

Marine and Environmental Sciences

Website (<http://www.northeastern.edu/mes/>)

Geoffrey C. Trussell, PhD

Professor and Chair

Jonathan H. Grabowski, PhD

Professor and Graduate Program Director

Marine Science Center

781.581.7370

781.581.6076 (fax)

gradmes@northeastern.edu

The PhD in Marine and Environmental Sciences is designed to train high-caliber and independent scientists whose research addresses fundamental and applied ecological and evolutionary questions at local, regional, national, and global scales. This training will include both general and specialized coursework in ecology and evolution, geoscience, sustainability, and marine sciences, with curricular programs providing specialized options tailored to each student's research interests. Students benefit from top-notch research facilities at the Marine Science Center in Nahant and on the main campus in Boston. Graduates of the program are prepared for careers in academia, government agencies, and the private sector.

The PhD in Human Behavior and Sustainability Sciences is a joint program with the Department of Psychology. The program combines training in psychology with the ecological and geophysical sciences to produce boundary-breaking scholars who can accelerate sustainability solutions that are interdisciplinary and transformative. The proposed curriculum integrates degree requirements from existing PhD programs in psychology and marine and environmental sciences (sustainability sciences concentration), with the addition of a set of specialized core courses and integrated cross-disciplinary research training. It also allows students broad latitude in designing their specialty within the parameters of the program.

The Master of Science in Marine Biology, also known as the Three Seas Program, gives students an opportunity to learn in three world-renowned research facilities in New England, the Caribbean, and the Pacific Northwest. In addition to rigorous coursework, the program offers the opportunity for students to formulate research questions, design and conduct critical experiments, and interpret and present results. The 15-month program culminates with an internship in the field and independent research project.

The Master of Science in Environmental Science and Policy is a joint program between the College of Science and the College of Social Sciences and Humanities. The interdisciplinary program aims to prepare the next generation of environmental professionals for dynamic opportunities focused on the science and policy of sustainability and resilience.

The Master of Science in Climate Science and Engineering is offered jointly by the College of Engineering and the College of Science. The program provides training in the fundamental scientific processes that underpin the structure and dynamics of the climate, as well as the engineering strategies and technologies required for decarbonization and adaptation to climate change.

Programs

Doctor of Philosophy (PhD)

- Human Behavior and Sustainability Sciences (p. 1169) (Boston)
- Marine and Environmental Sciences (p. 1165) (Boston)

Master of Science (MS)

- Climate Science and Engineering (p. 520) (Boston)
- Environmental Science and Policy (p. 1174) (Boston)
- Marine Biology (p. 1175) (Boston)

Graduate Certificate

- Sustainability Sciences (p. 1176) (Boston)

Marine and Environmental Sciences, PhD (Boston)

The PhD in Marine and Environmental Sciences (MES) program provides students with advanced course work and training in the concentration areas of marine sciences, geosciences, sustainability sciences, and ecology and evolutionary biology.

Students must pass three examinations during the course of their graduate studies:

1. An oral examination by the student's dissertation committee.
2. A proposal defense presented to the student's dissertation committee that explains the research areas that the student proposes to work in.
3. A defense of the student's written dissertation consisting of a public seminar, public question-and-answer period, and private defense of their work to their dissertation committee. Dissertation committees consist of at least four Northeastern faculty and one external faculty member.

A cumulative GPA of 3.000 is required for graduation. All PhD students are required to have at least two first-authored publications submitted to or accepted in a peer-reviewed journal prior to their defense. The PhD will be awarded following submission of a dissertation, approved by the candidate's dissertation committee, to the College of Science.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Marine and Environmental Sciences (<https://catalog.northeastern.edu/graduate/science/marine-environmental-sciences/marine-environmental-sciences-ms/>) degree. Note that no students will be admitted directly into the Marine and Environmental Sciences program to pursue a master's degree.

PhD Program Requirements**Bachelor's Degree Entrance**

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
 Dissertation committee
 Qualifying examination
 Dissertation proposal
 Candidacy
 First-author publication
 Dissertation defense

Core Requirements

Code	Title	Hours
Statistics		
Complete one of the following:		4-5
EEMB 5522	Experimental Design Marine Ecology	
ENVR 6500 and ENVR 6501	Biostatistics and Lab for ENVR 6500	
Alternative statistics course as approved by graduate committee		
Research		
Complete the following (repeatable) course twice:		8
EEMB 8984	Research	

Concentration

Complete one of the following concentrations:

- Ecology and Evolutionary Biology (p. 1166)
- Sustainability Sciences (p. 1167)
- Geosciences (p. 1167)
- Marine Sciences (p. 1167)

ECOLOGY AND EVOLUTIONARY BIOLOGY

Code	Title	Hours
Seminars		
EEMB 7102	Seminar in Ecology and Evolutionary Biology	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
Readings		
EEMB 8102	Readings in Ecology and Evolutionary Biology	2
Concentration-Specific Electives		
Complete 12 semester hours from the following:		12
EEMB 5130	Population Dynamics	
EEMB 5504	Biology of Corals	
EEMB 5506	Biology and Ecology of Fishes	
EEMB 5508	Marine Birds and Mammals	
EEMB 5518	Ocean and Coastal Processes	
EEMB 5520	Tropical Marine Ecology	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	

Substitutions may be made with approval of graduate committee.

SUSTAINABILITY SCIENCES

Code	Title	Hours
Seminars		
EEMB 7103	Seminar in Sustainability Sciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7104	Seminar in Geosciences	
Readings		
EEMB 8103	Readings in Sustainability Sciences	2
Concentration-Specific Electives		
Complete 12 semester hours from the following:		12
EEMB 5130	Population Dynamics	
EEMB 5506	Biology and Ecology of Fishes	
EEMB 5518	Ocean and Coastal Processes	
ENVR 5115	Advanced Topics in Environmental Geology	
ENVR 5260	Geographical Information Systems	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 6406	Analyzing Complex Digitized Data	
POLS 7334	Social Networks	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 7346	Resilient Cities	
Substitutions may be made with approval of graduate committee.		

GEOSCIENCES

Code	Title	Hours
Seminars		
EEMB 7104	Seminar in Geosciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
Readings		
EEMB 8104	Readings in Geosciences	2
Concentration-Specific Electives		
Complete 12 semester hours from the following:		12
EEMB 5518	Ocean and Coastal Processes	
ENVR 5115	Advanced Topics in Environmental Geology	
ENVR 5190	Soil Science	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
Substitutions may be made with approval of graduate committee.		

MARINE SCIENCES

Code	Title	Hours
Seminars		
EEMB 7101	Seminar in Marine Sciences	2
Complete one of the following:		2
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
Readings		
EEMB 8101	Readings in Marine Sciences	2
Concentration-Specific Electives		

Complete 12 semester hours from the following: 12

EEMB 5130	Population Dynamics
EEMB 5504	Biology of Corals
EEMB 5506	Biology and Ecology of Fishes
EEMB 5508	Marine Birds and Mammals
EEMB 5518	Ocean and Coastal Processes
EEMB 5520	Tropical Marine Ecology
ENVR 5260	Geographical Information Systems

Substitutions may be made with approval of graduate committee.

Dissertation

Code	Title	Hours
EEMB 9990	Dissertation Term 1	
EEMB 9991	Dissertation Term 2	

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review

Dissertation committee

Qualifying examination

Dissertation proposal

Candidacy

First-author publication

Dissertation defense

Core Requirements

Code	Title	Hours
Statistics		
Complete one of the following:		4-5
ENVR 6500 and ENVR 6501	Biostatistics and Lab for ENVR 6500	
EEMB 5522	Experimental Design Marine Ecology	

Alternative statistics course as approved by graduate committee

Concentration

Complete one of the following concentrations:

- Ecology and Evolutionary Biology (p. 1166)
- Sustainability Sciences (p. 1167)
- Geosciences (p. 1167)
- Marine Sciences (p. 1167)

ECOLOGY AND EVOLUTIONARY BIOLOGY

Code	Title	Hours
Seminars		
EEMB 7102	Seminar in Ecology and Evolutionary Biology	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
Readings		
EEMB 8102	Readings in Ecology and Evolutionary Biology	2

SUSTAINABILITY SCIENCES

Code	Title	Hours
Seminars		
EEMB 7103	Seminar in Sustainability Sciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7104	Seminar in Geosciences	
Readings		
EEMB 8103	Readings in Sustainability Sciences	2

GEOSCIENCES

Code	Title	Hours
Seminars		
EEMB 7104	Seminar in Geosciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
Readings		
EEMB 8104	Readings in Geosciences	2

MARINE SCIENCES

Code	Title	Hours
Seminars		
EEMB 7101	Seminar in Marine Sciences	2
Complete one of the following:		2
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
Readings		
EEMB 8101	Readings in Marine Sciences	2

Dissertation

Code	Title	Hours
EEMB 9990	Dissertation Term 1	
EEMB 9991	Dissertation Term 2	

Program Credit/GPA Requirements

10 total semester hours required

Minimum 3.000 GPA required

Human Behavior and Sustainability Sciences, PhD (Boston)**Overview**

The persistent failure to integrate the social, behavioral, and cognitive sciences with ecological and geophysical sciences is a critical friction point reducing the viability and effectiveness of sustainability solutions. Therefore, a degree program that combines training in psychology with the ecological and geophysical sciences will produce boundary-breaking scholars who can accelerate sustainability solutions that are robustly informed by the results of scientific research. The proposed curriculum integrates degree requirements from existing PhD programs in psychology and marine and environmental sciences (sustainability sciences concentration), with the addition of a set of specialized core courses and integrated cross-disciplinary research training. It also allows students broad latitude in designing their specialty within the parameters of the program.

The PhD in Human Behavior and Sustainability Sciences program provides students with the following advanced coursework and training. Students must pass two examinations during the course of their graduate studies to achieve candidacy:

1. A qualifying paper that the student will write and present to their dissertation committee.
2. A proposal defense presented to the student's dissertation committee that explains the research areas that the student proposes to work in.

At the end of the program, students will defend their written dissertation, which consists of a public seminar, public question-and-answer period, and private defense of their work to their dissertation committee. Dissertation committees consist of at least four Northeastern University faculty and one external faculty member.

A cumulative grade-point average of 3.000 is required for graduation. The PhD will be awarded following submission of a dissertation, approved by the candidate's dissertation committee, to the College of Science.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Cross-Disciplinary Science (<https://catalog.northeastern.edu/graduate/science/interdisciplinary/cross-disciplinary-science-ms-bos/>) degree. Note that no students will be admitted directly into the Cross-Disciplinary Science program to pursue a master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Dissertation committee
Qualifying paper and presentation
Dissertation proposal and presentation
Candidacy
Dissertation/dissertation defense
Teaching experience

Core Requirements

Code	Title	Hours
EEMB 7103	Seminar in Sustainability Sciences	2
EEMB 8103	Readings in Sustainability Sciences	2
ENVR 5450	Applied Social-Ecological Systems Modeling	4
PSYC 5180	Quantitative Methods 1	3
PSYC 5181	Quantitative Methods 2	3
PSYC 5410 or ENVR 5410	Human Behavior and Sustainability Human Behavior and Sustainability	3

Research

Code	Title	Hours
Complete two semesters from the following:		6
PSYC 8401 or EEMB 8984	Research Project Research	

Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8
Psychology Breadth Courses		
PSYC 5110	Cognitive Science	
PSYC 5120	Proseminar in Sensation	
PSYC 5130	Proseminar in Perception	
PSYC 5140	Proseminar in Biology of Behavior	
PSYC 5150	Proseminar in Clinical Neuroscience	
PSYC 5170	Social and Affective Science	
Sustainability Breadth Courses		
EEMB 5130	Population Dynamics	
EEMB 5506	Biology and Ecology of Fishes	
EEMB 5518	Ocean and Coastal Processes	
EEMB 5522	Experimental Design Marine Ecology	
ENVR 5115	Advanced Topics in Environmental Geology	
ENVR 5150	Climate and Atmospheric Change	
ENVR 5260	Geographical Information Systems	

ENVR 5350	Sustainable Energy and Climate Solutions
ENVR 5600	Coastal Processes, Adaptation, and Resilience
ENVR 5700	Streams and Watershed Ecology
ENVR 5750	Urban Ecology
ENVR 5800	Climate Adaptation and Nature-Based Solutions
ENVR 6150	Food Security and Sustainability
ENVR 6500 and ENVR 6501	Biostatistics and Lab for ENVR 6500
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
INSH 6300	Research Methods in the Social Sciences
INSH 6406	Analyzing Complex Digitized Data
INTL 5100	Climate and Development
PHTH 5214	Environmental Health
PPUA 5246	Participatory Modeling for Collaborative Decision Making
PPUA 5249	Sustainable Urban Coastal Policy
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5267	Climate Policy and Justice
PPUA 5268	International Environmental Policy
Psychology Depth Courses	
PSYC 7250	Seminar in Clinical Neuroscience
PSYC 7300	Advanced Quantitative Analysis
Sustainability Depth Courses	
EEMB 7101	Seminar in Marine Sciences
EEMB 7102	Seminar in Ecology and Evolutionary Biology
EEMB 7103	Seminar in Sustainability Sciences
EEMB 7104	Seminar in Geosciences
ENVR 6102	Environmental Science and Policy Seminar 2
LPSC 7312	Cities, Sustainability, and Climate Change
POLS 7334	Social Networks
PPUA 6101	Environmental Science and Policy Seminar 1
PPUA 7346	Resilient Cities
SOCL 7267	Environment, Health, and Society

Dissertation

Code	Title	Hours
Please enroll in either EEMB 9990 or PSYC 9990 for one semester after achieving candidacy. In the following semester, please enroll in either EEMB 9991 or PSYC 9991.		
EEMB 9990	Dissertation Term 1	
or PSYC 9990	Dissertation Term 1	
EEMB 9991	Dissertation Term 2	
or PSYC 9991	Dissertation Term 2	

Program Credit/GPA Requirements

31 total semester hours required

Minimum 3.000 GPA required

Climate Science and Engineering, MS (Boston)

Overview

The Master of Science in Climate Science and Engineering is offered jointly by the College of Engineering and the College of Science. The program provides training in the fundamental scientific processes that underpin the structure and dynamics of the climate, as well as the engineering strategies and technologies required for decarbonization and adaptation to climate change.

Incoming students will typically hold a bachelor's degree in a science, engineering, or related field. The program is designed to prepare students for climate-facing positions in the public or private sectors and can serve as a springboard for students interested in pursuing doctoral-level research. Students must take at least 12 semester hours of College of Science courses and at least 12 semester hours of College of Engineering courses, which includes a report, thesis, or coursework option.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Student should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP

Master's Degree in Climate Science and Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Climate Science and Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership (p. 738), 12 semester hours of the certificate coursework may be applied to the restricted elective requirements of this program's coursework option. Of the remaining 20 semester hours required by this program, students must take 12 semester hours of College of Science courses (subject codes EEMB and ENVR) and 8 semester hours from College of Engineering courses (subject codes CIVE, EECE, ENSY, MATL, ME, and SBSY).

The Department of Civil and Environmental Engineering encourages students pursuing the Graduate Certificate in Engineering Leadership (p. 738) to complete their MS coursework requirements in their first year and their certificate requirements in their second year. Students who prefer to complete their certificate requirements in their first year are asked to speak with their MS degree advisor in advance.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. In order to ensure a balance of training across science and engineering, students must take at least 12 semester hours of College of Science courses (starting with EEMB, ENVR) and at least 12 semester hours of College of Engineering courses (starting with CIVE, EECE, ENSY, MATL, ME, SBSY) from the core requirements and restricted elective course options.

Core Requirements

Code	Title	Hours
Complete 20 semester hours from the core requirements listed below (any core course not used to meet this core course requirement can be taken as a restricted elective):		20
CIVE 5150 or ENVR 5150	Climate and Atmospheric Change Climate and Atmospheric Change	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
CIVE 5366	Air Quality Engineering and Science	
CIVE 5670 or ENVR 5670	Global Biogeochemistry Global Biogeochemistry	
CIVE 7110	Critical Infrastructure Resilience	
ENVR 5350	Sustainable Energy and Climate Solutions	
ENVR 5600	Coastal Processes, Adaptation, and Resilience	
ENVR 5800	Climate Adaptation and Nature-Based Solutions	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the restricted electives course list below. (p. 522)		12

REPORT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
or EEMB 8984	Research	
Complete 8 semester hours from the restricted electives course list below. (p. 522)		8

THESIS OPTION

Code	Title	Hours
Complete CIVE 7945 and CIVE 7990 for 8 semester hours or complete EEMB 8984 twice for 8 semester hours:		8
CIVE 7945	Master's Project	
and CIVE 7990	and Thesis	
EEMB 8984	Research (Completed twice)	
Complete 4 semester hours from the restricted electives course list below. (p. 522)		4

In addition to completing the thesis course, College of Engineering students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Restricted Electives

Code	Title	Hours
CIVE 5280	Remote Sensing of the Environment	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7282	Coastal and Hydraulic Modeling	
CIVE 7385	Public Transportation	
CIVE 7392	Special Topics in Environmental Engineering	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ENVR 5210	Environmental Planning	
ENVR 5220	Ecosystem-Based Management	
ENVR 5563	Advanced Spatial Analysis	
INTL 5100	Climate and Development	
LAW 7634	Energy Law and Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5685	Solar Thermal Engineering	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
SBSY 5100	Sustainable Design and Technologies in Construction	
SBSY 5200	Sustainable Engineering Systems for Buildings	

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	

or ENCP 6955

Co-op Work Experience Abroad - Half-Time

or ENCP 6965

Co-op Work Experience Abroad

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Environmental Science and Policy, MS (Boston)

The Master of Science in Environmental Science and Policy program emphasizes a broadly interdisciplinary and synthetic approach that integrates knowledge in the environmental sciences (conservation biology, climate change, fisheries science, ecosystem function, biodiversity, restoration ecology) with the social sciences (policy, economics, sociology, political science, and development) and humanities (environmental history, philosophy, and ethics). The goal of the program is to equip professionals with substantive breadth in knowledge and skills at the intersection of environmental science and policy. The program focuses on training students to think critically about the underlying causes of environmental problems and understanding the reciprocal relationships between coupled human-natural ecosystems and the interconnections between social and technological innovations. The program explores practical approaches and potential solutions that decision makers need to evaluate in policy debates related to promoting environmental sustainability.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Seminars		
PPUA 6101	Environmental Science and Policy Seminar 1	4
ENVR 6102	Environmental Science and Policy Seminar 2	4
Skills Courses		
Complete 2 courses from the following. At least one course needs to be taken from the College of Science Skills Course List and one course from the College of Social Sciences and Humanities Skills Course List.		8
<i>College of Science Skills Course List</i>		
EEMB 5130	Population Dynamics	
EEMB 5522	Experimental Design Marine Ecology	
ENVR 5150	Climate and Atmospheric Change	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
ENVR 5450	Applied Social-Ecological Systems Modeling	
ENVR 6500	Biostatistics	
<i>College of Social Sciences and Humanities Skills Course List</i>		
INSH 5301	Introduction to Computational Statistics	
INSH 6300	Research Methods in the Social Sciences	
INSH 7400	Quantitative Analysis	
LPSC 7311	Strategizing Public Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Electives

Complete five courses from the following list. At least one course must be taken from the College of Science Elective Course List and one course from the College of Social Sciences and Humanities Elective Course List. Any skills course not taken to fulfill the skills courses requirement can be taken as an elective. Students may petition to enroll in other relevant graduate courses offered by other schools at Northeastern University.

COLLEGE OF SCIENCE ELECTIVE LIST

Code	Title	Hours
EEMB 5130 - EEMB 8984		
ENVR 5115 - ENVR 6900		

COLLEGE OF SOCIAL SCIENCES AND HUMANITIES ELECTIVE LIST

Code	Title	Hours
INSH 5302	Information Design and Visual Analytics	
INTL 5100	Climate and Development	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5100 - PPUA 7346		
SOCL 7267	Environment, Health, and Society	

Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

Marine Biology, MS (Boston)

The MS in Marine Biology provides students the opportunity to study marine biology in three distinct environments at three world-renowned research facilities in New England, the Caribbean, and the Pacific Northwest. An internship in the field and independent research project provide the capstone to the fifteen-month graduate program.

Much more than course work in a classroom, the MS in Marine Biology delivers inquiry-based curriculum in marine science during which our students formulate research questions, design and conduct critical experiments, and interpret and present results. You will have an opportunity not only learn science, you have an opportunity to learn how to do science and become a marine scientist.

This program is for students eager to broaden their knowledge of marine biology or who want to further refine their interests.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Students register for International Study—Three Seas Program (ABRS 5120) for the fall and spring terms of year 1.

Code	Title	Hours
Biology		
EEMB 5504 and EEMB 5505	Biology of Corals and Lab for EEMB 5504	3
EEMB 5506 and EEMB 5507	Biology and Ecology of Fishes and Lab for EEMB 5506	3
EEMB 5508	Marine Birds and Mammals	3
EEMB 5518 and EEMB 5519	Ocean and Coastal Processes and Lab for EEMB 5518	3
EEMB 5533 and EEMB 5535	Marine Invertebrate Zoology and Botany and Lab for EEMB 5533	3
Ecology		
EEMB 5520	Tropical Marine Ecology	2
EEMB 5522	Experimental Design Marine Ecology	4
EEMB 5540 and EEMB 5541	Changing Global Oceans and Lab for EEMB 5540	3
Research		

Take the following (repeatable) course twice:			2
EEMB 7674	Marine Biology Research Project		
Seminar			
EEMB 5303	Marine Biology Careers Seminar		1
Sustainability			
EEMB 5538	Conservation and Restoration of Marine Systems		3
EEMB 5542	Marine Spatial Planning		4
EEMB 5546	Sustainability of the Land-Sea Interface		3

Program Credit/GPA Requirements

37 total semester hours required
Minimum 3.000 GPA required

Plan of Study
Sample Plan of Study

FALL START

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
EEMB 5303		1 EEMB 5504 and EEMB 5505		3 EEMB 7674	1
EEMB 5522		4 EEMB 5506 and EEMB 5507		3	
EEMB 5546		3 EEMB 5508		3	
EEMB 5542		4 EEMB 5518 and EEMB 5519		3	
EEMB 5533 and EEMB 5535		3 EEMB 5520		2	
		EEMB 5538		3	
		EEMB 5540 and EEMB 5541		3	
		15		20	1
Year 2					
Fall	Hours				
EEMB 7674		1			
		1			

Total Hours: 37

Sustainability Sciences, Graduate Certificate (Boston)

Overview

Environmental sustainability challenges are inherently complex and multidisciplinary and will require a workforce capable of collaborating across interdisciplinary teams. Thus, it is critical that the next generation of sustainability scientists and engineers receive broad, interdisciplinary training so that they are better prepared to address these complex challenges. This certificate will provide social science and engineering students with fundamental training in sustainability science.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Courses		
Introduction to Sustainability Science		
ENVR 6102	Environmental Science and Policy Seminar 2	4
Physical and Environmental Processes and Systems		
Complete one of the following:		4
ENVR 5150	Climate and Atmospheric Change	

ENVR 5600	Coastal Processes, Adaptation, and Resilience
ENVR 5670	Global Biogeochemistry
ENVR 5700	Streams and Watershed Ecology
Environmental Planning, Management, and Sustainability	
Complete one of the following:	
EEMB 6475	Advanced Wildlife Ecology
ENVR 5210	Environmental Planning
ENVR 5220	Ecosystem-Based Management
ENVR 5350	Sustainable Energy and Climate Solutions
ENVR 5750	Urban Ecology
ENVR 5800	Climate Adaptation and Nature-Based Solutions
ENVR 6150	Food Security and Sustainability
Research and Analytical Skills Development	
Complete one of the following:	
EEMB 5130	Population Dynamics
ENVR 5450	Applied Social-Ecological Systems Modeling
ENVR 5500	Advanced Biostatistics
ENVR 5984	Research

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Mathematics

Website (<https://cos.northeastern.edu/mathematics/>)

Egon Schulte, PhD
Professor and Chair

617.373.2450

Mathematics is of ever-increasing importance to our society and everyday life. It has long been the language of science and technology and provides a rich source of methods for analyzing and solving problems encountered in the physical world. Today, mathematics is essential in virtually all fields of human endeavor including business, the arts, and the social sciences.

PhD students work with internationally recognized faculty in research programs in both pure and applied mathematics. The program is designed to provide students with a broad overview of current mathematics and a strong command of areas of specialization.

The Department of Mathematics also offers Master of Science degrees in mathematics, applied mathematics, operations research, and statistics, as well as a graduate certificate in applied mathematics. These programs prepare students for careers in business, industry, or government. Students pursuing degrees in applied math and operations research take part in Northeastern University's signature co-op program.

In addition to the numerous seminars and colloquia at Northeastern, there are ample opportunities for students in the Boston area to learn about important recent advances in the field.

Programs

Doctor of Philosophy (PhD)

- Mathematics (p. 1178) (Boston)

Master of Science (MS)

- Applied Mathematics (p. 1184) (Boston)
- Mathematics (p. 1187) (Boston)
- Statistics (p. 187) (Boston)
- Statistics—Connect (p. 189) (Boston)

Master of Science in Operations Research (MSOR)

- Operations Research (p. 1191) (Boston)

Graduate Certificate

- Applied Mathematics (p. 1192) (Boston)

Mathematics, PhD (Boston)

Course Requirements

Students entering with a bachelor's degree are required to take 48 semester hours of coursework divided between foundational and advanced offerings. Students entering the program will be allowed to place out of some (possibly all) of the six basic-level courses; the graduate coordinator together with the first-year graduate advisor will determine the allowable course substitutions and will advise the student which foundational courses to take. Students may satisfy requirements for Algebra 1 (MATH 5111) and Analysis 1: Functions of One Variable (MATH 5101) by taking qualifying exams in algebra 1 and in analysis 1 at the start of the program. Students may satisfy foundational course requirements if they demonstrate proficiency by passing an assessment exam in the course at the beginning of the semester or by demonstrating that they have taken a similar course and have adequate knowledge of the course material (syllabus and transcript are required; a brief oral examination is also required in that case). Academic advising will happen just before the start of each term and during the add/drop period in order to plan a student's course registration for the term. A complete listing of foundational and advanced courses is available from the Department of Mathematics and the graduate dean's office. Students are not permitted to register for more than two "readings" courses and three "topics" courses for credit toward the degree without explicit permission from the graduate dean. A minimum GPA of 3.000 is required for degree conferral.

Teaching Requirement

Some teaching experience is required while in the program. Students must attend university-led TA training at the start of the program; attend a one-semester TA training course conducted by faculty from the Department of Mathematics teaching committee; spend one semester shadowing faculty in the undergraduate classroom; and perform recitations and grading for the undergraduate course they are shadowing.

Qualifying Exams

Qualifying exam sessions are given once in spring and once in fall. Students will be required to pass four qualifying exams: algebra 1, analysis 1, and two other exams. The possible additional topics for qualifying exams are algebra 2, analysis 2, combinatorics, geometry, ordinary differential equations, partial differential equations, probability, statistics, topology, and algebraic geometry. A qualifying exam may be taken twice by any student. Additional attempts may be allowed at the discretion of the graduate committee with permission from the graduate dean in the College of Science. Two qualifying exams should be passed no later than the end of the second year and all four by the end of the third year.

Doctoral Candidacy

PhD candidacy is reached when all of the following conditions are met:

- Completion of eight advanced courses
- Identification of an unsolved research problem
- Successful passing of four qualifying exams
- Assignment of PhD supervisor and creation of a 1-page initial plan
- Completion of a 3-page plan of research
- Completion of a 10-page progress report and a one-hour defense of proposal, presented to supervisor and three faculty members of graduate committee

Dissertation Requirement

Each candidate must complete a dissertation that embodies the results of extended research and makes an original contribution to the field. This work should give evidence of the candidate's ability to carry out independent investigation and interpret, in a logical manner, the results of the research. There are two stages to this process:

- **Stage 1:** Students in the PhD program must have a dissertation supervisor within two years after joining the PhD program. The department views the failure of a student to find a supervisor within two years of joining the PhD program with concern and considers this sufficient cause to review the student's status in the PhD program. The process of obtaining a dissertation supervisor always involves two choices—the student chooses the supervisor, and the supervisor chooses the student. For this reason, the department does not guarantee a dissertation supervisor for every student, but the department recognizes its responsibility to help the student find a satisfactory match. This aid is usually provided by the student's graduate advisor, who should be familiar with the student's progress in finding a dissertation supervisor. The dissertation supervisor guides the student's further education as well as directs the student's dissertation. The dissertation itself must represent an original solution of a problem in the chosen area of mathematics that makes a significant contribution to the mathematical knowledge in that area. Students must enroll in Dissertation or Dissertation Continuation while fulfilling the dissertation requirements.
- **Stage 2 (dissertation defense):** The final oral examination on the dissertation is held in accordance with university regulations and given by a dissertation committee of four faculty members (three from the university, including the supervisor, and one from outside Northeastern University). The dissertation supervisor should propose this dissertation committee to the graduate committee for its approval at least one month before the PhD dissertation defense.

Program Requirements

Bachelor's Degree Entry

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Four qualifying examinations
Annual review
Teaching requirement
Doctoral candidacy
Dissertation committee
Dissertation proposal
Progress report and presentation
Dissertation defense

Prerequisites

Code	Title	Hours
Algebra and Analysis		
Complete 0–8 semester hours from the following:		0-8
MATH 5101	Analysis 1: Functions of One Variable	
MATH 5111	Algebra 1	

Advanced Coursework

Code	Title	Hours
Complete 32 semester hours from the advanced coursework list. Only two readings and three topics courses are allowed. (p. 1180)		32

Tracks

Complete one of the following three tracks:

- Pure Track (p. 1179)
- Discrete Track (p. 1180)
- Probability and Statistics Track (p. 1180)

Dissertation

Code	Title	Hours
MATH 9990	Dissertation Term 1	
MATH 9991	Dissertation Term 2	

Program Credit/GPA Requirements

48–56 total semester hours required

Minimum 3.000 GPA required

PURE TRACK

Code	Title	Hours
Analysis		
MATH 5102	Analysis 2: Functions of Several Variables	4
Algebra		
MATH 5112	Algebra 2	4
Foundational Courses		
Complete up to 8 semester hours from the following:		0-8
MATH 5122	Geometry 1	
MATH 5352	Quantum Computation and Information	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7241	Probability 1	

DISCRETE TRACK

Code	Title	Hours
Algebra		
MATH 5112	Algebra 2	4
Probability		
MATH 7241	Probability 1	4
Foundational Courses		
Complete up to 8 semester hours from the following:		0-8
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5111	Algebra 1	
MATH 5112	Algebra 2	
MATH 5352	Quantum Computation and Information	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7342	Mathematical Statistics	

PROBABILITY AND STATISTICS TRACK

Code	Title	Hours
Analysis		
Complete 4 semester hours from the following:		4
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 7203	Numerical Analysis 1	
Probability		
MATH 7241 or MATH 7342	Probability 1 Mathematical Statistics	4
Foundational Courses		
Complete up to 8 semester hours from the following:		8
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5112	Algebra 2	
MATH 5352	Quantum Computation and Information	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7241	Probability 1	
MATH 7342	Mathematical Statistics	

Advanced Coursework List

Code	Title	Hours
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7223	Riemannian Optimization	
MATH 7233	Graph Theory	
MATH 7234	Optimization and Complexity	
MATH 7243	Machine Learning and Statistical Learning Theory 1	
MATH 7301	Functional Analysis	
MATH 7311	Commutative Algebra	
MATH 7315	Algebraic Number Theory	
MATH 7316	Lie Algebras	
MATH 7320	Modern Algebraic Geometry	
MATH 7321	Topology 3	
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7341	Probability 2	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
MATH 7346 to MATH 7361		
MATH 7371	Morse Theory	

MATH 7976 to MATH 8986

MATH 9984	Research
Topics	
Only three topics courses are allowed.	
MATH 7362	Topics in Algebra
MATH 7363	Topics in Algebraic Geometry
MATH 7364	Topics in Representation Theory
MATH 7375	Topics in Topology
MATH 7381	Topics in Combinatorics
Readings	
Only two readings courses are allowed.	
MATH 7721	Readings in Topology
MATH 7734	Readings in Algebra
MATH 7735	Readings in Algebraic Geometry
MATH 7736	Readings in Discrete Geometry
MATH 7741	Readings in Probability and Statistics
MATH 7771	Readings in Geometry

Advanced Entry Program Requirements

Course Requirements

Advanced students who enter the PhD program with a master's degree (or equivalent) will be allowed to place out of some (possibly all) of the six basic-level courses; the graduate coordinator together with the first-year graduate advisor will determine the allowable course substitutions and will advise the student which foundational courses to take. Students may satisfy requirements for Algebra 1 (MATH 5111) and Analysis 1: Functions of One Variable (MATH 5101) by taking qualifying exams in algebra 1 and in analysis 1 at the start of the program. Students may satisfy foundational course requirements if they demonstrate proficiency by passing an assessment exam in the course at the beginning of the semester or by demonstrating that they have taken a similar course and have adequate knowledge of the course material (syllabus and transcript are required; a brief oral examination is also required in that case). Academic advising will happen just before the start of each term and during the add/drop period in order to plan a student's course registration for the term. A complete listing of foundational and advanced courses is available from the Department of Mathematics and the graduate dean's office. Students are not permitted to register for more than two "readings" courses and three "topics" courses for credit toward the degree without explicit permission from the graduate dean. A minimum grade-point average (GPA) of 3.000 is required for degree conferral.

Teaching Requirement

Some teaching experience is required while in the program. Students must attend university-led TA training at the start of the program; attend a one-semester TA training course conducted by faculty from the Department of Mathematics teaching committee; spend one semester shadowing faculty in the undergraduate classroom; and perform recitations and grading for the undergraduate course they are shadowing.

Qualifying Exams

Qualifying exam sessions are given once in spring and once in fall. Students will be required to pass four qualifying exams: algebra 1, analysis 1, and two other exams. The possible additional topics for qualifying exams are algebra 2, analysis 2, combinatorics, geometry, ordinary differential equations, partial differential equations, probability, statistics, topology, and algebraic geometry. A qualifying exam may be taken twice by any student. Additional attempts may be allowed at the discretion of the graduate committee with permission from the graduate dean in the College of Science. Two qualifying exams should be passed no later than the end of the second year and all four by the end of the third year.

Doctoral Candidacy

PhD candidacy is reached when all of the following conditions are met:

- Completion of eight advanced courses
- Identification of an unsolved research problem
- Successful passing of four qualifying exams
- Assignment of PhD supervisor and creation of a 1-page initial plan
- Completion of a 3-page plan of research
- Completion of a 10-page progress report and a one-hour defense of proposal, presented to supervisor and three faculty members of graduate committee

Dissertation Requirement

Each candidate must complete a dissertation that embodies the results of extended research and makes an original contribution to the field. This work should give evidence of the candidate's ability to carry out independent investigation and interpret, in a logical manner, the results of the research. There are two stages to this process:

- **Stage 1:** Students in the PhD program must have a dissertation supervisor within two years after joining the PhD program. The department views the failure of a student to find a supervisor within two years of joining the PhD program with concern and considers this sufficient cause to review the student's status in the PhD program. The process of obtaining a dissertation supervisor always involves two choices—the student chooses the supervisor, and the supervisor chooses the student. For this reason, the department does not guarantee a dissertation supervisor for every student, but the department recognizes its responsibility to help the student find a satisfactory match. This aid is usually provided by the student's graduate advisor, who should be familiar with the student's progress in finding a dissertation supervisor. The dissertation supervisor guides the student's further education as well as directs the student's dissertation. The dissertation itself must represent an original solution of a problem in the chosen area of mathematics that makes a significant contribution to the mathematical knowledge in that area. Students must enroll in Dissertation or Dissertation Continuation while fulfilling the dissertation requirements.
- **Stage 2 (dissertation defense):** The final oral examination on the dissertation is held in accordance with university regulations and given by a dissertation committee of four faculty members (three from the university, including the supervisor, and one from outside Northeastern University). The dissertation supervisor should propose this dissertation committee to the graduate committee for its approval at least one month before the PhD dissertation defense.

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Four qualifying examinations
 Annual review
 Teaching requirement
 Doctoral candidacy
 Dissertation committee
 Dissertation proposal
 Progress report and presentation
 Dissertation defense

Code	Title	Hours
Complete 0–16 semester hours of the following courses:		0-16
MATH 5101	Analysis 1: Functions of One Variable	
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5111	Algebra 1	
MATH 5112	Algebra 2	

Advanced Coursework

Code	Title	Hours
Complete 32 semester hours from the advanced coursework list. Only two readings and three topics courses are allowed. (p. 1180)		32

Tracks

Complete one of the following three tracks:

- Pure Track (p. 1179)
- Discrete Track (p. 1180)
- Probability and Statistics Track (p. 1180)

Dissertation

Code	Title	Hours
MATH 9990	Dissertation Term 1	
MATH 9991	Dissertation Term 2	

Program Credit/GPA Requirements

32–56 total semester hours required
 Minimum 3.000 GPA required

PURE TRACK

Code	Title	Hours
Foundational Courses		
Complete 0–8 semester hours from the following:		0-8
MATH 5122	Geometry 1	
MATH 5352	Quantum Computation and Information	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7241	Probability 1	

DISCRETE TRACK

Code	Title	Hours
Foundational Courses		
Complete 0–8 semester hours from the following:		0 - 8
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5111	Algebra 1	
MATH 5112	Algebra 2	
MATH 5352	Quantum Computation and Information	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7241	Probability 1	
MATH 7342	Mathematical Statistics	

PROBABILITY AND STATISTICS TRACK

Code	Title	Hours
Foundational Courses		
Complete 0–8 semester hours from the following:		0 - 8
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5112	Algebra 2	
MATH 5352	Quantum Computation and Information	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7241	Probability 1	
MATH 7342	Mathematical Statistics	

ADVANCED COURSEWORK LIST

Code	Title	Hours
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7223	Riemannian Optimization	
MATH 7233	Graph Theory	
MATH 7234	Optimization and Complexity	
MATH 7243	Machine Learning and Statistical Learning Theory 1	
MATH 7301	Functional Analysis	
MATH 7311	Commutative Algebra	
MATH 7315	Algebraic Number Theory	
MATH 7316	Lie Algebras	
MATH 7320	Modern Algebraic Geometry	
MATH 7321	Topology 3	
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7341	Probability 2	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
MATH 7346 to MATH 7361		
MATH 7371	Morse Theory	
MATH 7976 to MATH 8986		

MATH 9984	Research
Topics	
Only three topics courses are allowed.	
MATH 7362	Topics in Algebra
MATH 7363	Topics in Algebraic Geometry
MATH 7364	Topics in Representation Theory
MATH 7375	Topics in Topology
MATH 7381	Topics in Combinatorics
Readings	
Only two readings courses are allowed.	
MATH 7721	Readings in Topology
MATH 7734	Readings in Algebra
MATH 7735	Readings in Algebraic Geometry
MATH 7736	Readings in Discrete Geometry
MATH 7741	Readings in Probability and Statistics
MATH 7771	Readings in Geometry

Applied Mathematics, MS (Boston)

New applications of mathematics are constantly being discovered, and established techniques are being applied in new ways and in emerging fields. Northeastern University's Master of Science in Applied Mathematics caters to students who are looking to enter or who are currently working in a variety of applied math careers such as data science and high-tech firms, computer information and software firms, financial service and investment firms, academic institutions, and research institutes. Northeastern's master's program offers students an opportunity to obtain solid knowledge of mathematical modeling, statistics, and data analysis, as well as excellent programming skills, through experiential learning and co-op experiences from industry.

Students may complete a data science concentration, an operations research concentration, or an electives option. The value of the worldwide Big Data market is growing exponentially. Data science rooted in applied mathematics is essential in exploring Big Data from a wide range of science, businesses, and industries. The operations research concentration offers students study of the analytical and computational skills necessary to enhance efficiency and support decision making across diverse industries such as logistics, finance, and engineering. The electives option allows students to personalize their education with more in-depth knowledge of data science, statistics, or other areas of interest in applied mathematics.

Data Science Concentration

Data science is an interdisciplinary field using techniques and theories drawn from mathematics, statistics, computer science, information science, and related fields to uncover insights hidden in data and to make predictions and decisions. The data science concentration offers students opportunities to learn mathematical modeling, probability, and statistics, which are the theoretical background for data science. Courses in data visualization; machine learning and deep learning; statistical inference; algorithmic, numerical, and computational thinking; experimental design; and coding are also offered. The program offers a multimodal approach including lecture courses, data-driven computer labs, and industry projects. Some courses listed for this program are in collaboration with the College of Engineering and the Khoury College of Computer Sciences.

Operations Research Concentration

The operations research concentration offers students an opportunity to obtain a deep understanding of mathematical modeling and optimization techniques to solve complex operational problems. This concentration emphasizes areas such as decision analysis, stochastic processes, and advanced optimization to prepare students to tackle real-world challenges in fields like supply chain management, finance, and systems engineering. By integrating applied mathematics with problem-solving methodologies, students may gain the analytical and computational skills needed to enhance efficiency and inform decision making in both industry and research settings. Some courses listed for this program are offered in the College of Engineering.

Electives Option

Applications of mathematical modeling and methods are widely involved in different fields such as computer science, engineering, finance, health science, social science, artificial intelligence, etc. The electives option allows students to design their advanced coursework around an area of specific interest, pursue personalized training in applied mathematics, or strengthen an application to a PhD program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Modeling and Linear Algebra		
Complete 4 semester hours from the following:		4

MATH 5110	Applied Linear Algebra and Matrix Analysis	
MATH 5111	Algebra 1	
MATH 5131	Introduction to Mathematical Methods and Modeling	
Probability and Analysis		
Complete 4 semester hours from the following:		4
MATH 5101	Analysis 1: Functions of One Variable	
MATH 7241	Probability 1	
Statistics		
Complete 8 semester hours from the following:		8
MATH 7243	Machine Learning and Statistical Learning Theory 1	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	

Concentrations or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Data Science (p. 1185)
- Operations Research (p. 1185)
- Electives Option (p. 1186)

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Concentration in Data Science

Code	Title	Hours
No more than 8 semester hours of coursework outside of the MATH subject code may be applied to the requirements of this concentration.		
Core		
Complete 8 semester hours from the following (students may take other Khoury College of Computer Sciences courses not on the list in consultation with their faculty advisor):		8
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
MATH 7243	Machine Learning and Statistical Learning Theory 1	
Electives		
Complete 8 semester hours of courses at the 5000 level or above in the following subject area. See suggested elective course list. (p. 1186)		8
MATH		

Concentration in Operations Research

Code	Title	Hours
No more than 8 semester hours of coursework outside of the MATH subject code may be applied to the requirements of this concentration.		
Core		
Complete 8 semester hours from the following (students may take other College of Engineering courses not on the list in consultation with their faculty advisor):		8
IE 7200	Supply Chain Engineering	
MATH 7207	Algorithms for Optimization	
MATH 7234	Optimization and Complexity	

MATH 7341	Probability 2
OR 6205	Deterministic Operations Research
OR 7230	Probabilistic Operation Research
OR 7235	Inventory Theory
OR 7240	Integer and Nonlinear Optimization
OR 7245	Network Analysis and Advanced Optimization
OR 7270	Convex Optimization and Applications
OR 7310	Logistics, Warehousing, and Scheduling

Electives

Complete 8 semester hours of courses at the 5000 level or above in the following subject area. See suggested elective course list. (p. 1186) 8

MATH

Electives Option

Code	Title	Hours

Complete 16 semester hours in the following subject area. Students may take MATH courses at the 5000 level or above listed in other concentrations or the suggested elective course list. Courses outside of MATH may be chosen with faculty approval. 16

No more than 8 semester hours of coursework outside of the MATH subject code may be applied to requirements of this option.

MATH

Suggested Electives Course List

Code	Title	Hours

Students may complete other MATH courses not listed below and courses outside of MATH in consultation with their faculty advisor.

DS 5110	Essentials of Data Science
EECE 7205	Fundamentals of Computer Engineering
MATH 5352	Quantum Computation and Information
MATH 7203	Numerical Analysis 1
MATH 7205	Numerical Analysis 2
MATH 7207	Algorithms for Optimization
MATH 7223	Riemannian Optimization
MATH 7233	Graph Theory
MATH 7234	Optimization and Complexity
MATH 7339	Machine Learning and Statistical Learning Theory 2
MATH 7341	Probability 2
MATH 7342	Mathematical Statistics
MATH 7344	Regression, ANOVA, and Design

Additional Courses

The following are some theoretical MATH courses usually taken in the PhD program (these may not be offered every academic year):

MATH 5102	Analysis 2: Functions of Several Variables
MATH 5112	Algebra 2
MATH 7202	Partial Differential Equations 1
MATH 7221	Topology 2
MATH 7311	Commutative Algebra
MATH 7315	Algebraic Number Theory
MATH 7320	Modern Algebraic Geometry
MATH 7371	Morse Theory
MATH 7381	Topics in Combinatorics
MATH 7741	Readings in Probability and Statistics
MATH 8450	Research Seminar in Mathematics

Mathematics, MS (Boston)

This program offers students with a bachelor's degree in mathematics or a related field an opportunity to broaden their knowledge in the several fields of mathematics and its applications. The program is designed to prepare graduates for careers in business, industry, or government.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Algebra 1 and Analysis 1		
MATH 5101	Analysis 1: Functions of One Variable	4
MATH 5111	Algebra 1	4
Algebra 2 and Analysis 2		
MATH 5102	Analysis 2: Functions of Several Variables	4
MATH 5112	Algebra 2	4

Electives

Code	Title	Hours
Complete 16 semester hours from the following; no course can be used to satisfy both a requirement and an elective:		16
MATH 5122	Geometry 1	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7223	Riemannian Optimization	
MATH 7233	Graph Theory	
MATH 7234	Optimization and Complexity	
MATH 7241	Probability 1	
MATH 7243	Machine Learning and Statistical Learning Theory 1	
MATH 7311	Commutative Algebra	
MATH 7321	Topology 3	
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Statistics, MS (Boston)

The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The Master of Science in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical machine learning—Khoury College of Computer Sciences
- Statistical theory and modeling—College of Science

Students will follow all policies associated with their home college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 188)—Bouvé College of Health Sciences
- Statistical Machine Learning (p. 188)—Khoury College of Computer Sciences
- Statistical Theory and Modeling (p. 188)—College of Science

Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses may be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

Program Credit/GPA Requirements

31 total semester hours required (32 for students who declare the Concentration in Statistical Theory and Modeling and also opt to participate in co-op)

Minimum 3.000 GPA required

CONCENTRATION IN BIostatISTICS (BOUVÉ COLLEGE OF HEALTH SCIENCES)

Code	Title	Hours
Complete 12 semester hours from the following:		12
PHTH 5350	Using SAS in Public Health Research	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	
Optional Co-op		
HLTH 6964	Co-op Work Experience	0

CONCENTRATION IN STATISTICAL MACHINE LEARNING (KHOURY COLLEGE OF COMPUTER SCIENCES)

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Essentials of Data Science	4

Optional Co-op

CS 6964	Co-op Work Experience	0

CONCENTRATION IN STATISTICAL THEORY AND MODELING (COLLEGE OF SCIENCE)

Code	Title	Hours

Complete 12 semester hours from the following:

12

MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

Optional Co-op

EESC 6500	Pathways to Professional Success	1
EESC 6964	Co-op Work Experience	0

Statistics, MS—Connect (Boston)

The Master of Science in Statistics—Connect program is designed for students from all backgrounds with a BS/BA degree, provided the student has experience with basic calculus and statistics. The first semester of the degree program provides students with the foundational knowledge needed to study successfully alongside direct-entry graduate students. The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The MS in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouv  College of Health Sciences
- Statistical Machine Learning—Khoury College of Computer Sciences
- Statistical Theory and Modeling—College of Science

Students will follow all policies associated with their college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Connect Courses

Code	Title	Hours

Students are required to complete 8–10 semester hours from the following unless otherwise determined by the program:

8-10

CS 5001	Intensive Foundations of Computer Science	
MATH 5001	Accelerated Linear Algebra	
MATH 5002	Accelerated Multivariable Calculus	
MATH 5003	Accelerated Probability and Statistics	
MATH 5110	Applied Linear Algebra and Matrix Analysis	

Required Courses

Code	Title	Hours

MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4

PHTH 6800	Causal Inference in Public Health Research	3-4
or PHTH 6801	Causal Inference 1	
PHTH 6830	Generalized Linear Models	4

Concentrations

Complete one of the following concentrations:

- Biostatistics—Bouv  College of Health Sciences (p. 190)
- Statistical Machine Learning—Khoury College of Computer Sciences (p. 190)
- Statistical Theory and Modeling—College of Science (p. 190)

Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses can be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

Program Credit/GPA Requirements

39-41 total semester hours required (40-42 for students who declare the Concentration in Statistical Theory and Modeling and also opt to participate in co-op)

Minimum 3.000 GPA required

BIostatistics Concentration—Bouv  College of Health Sciences

Code	Title	Hours
Complete 12 semester hours from the following:		12
PHTH 5350	Using SAS in Public Health Research	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	
Optional Co-op		
HLTH 6964	Co-op Work Experience	0

Statistical Machine Learning Concentration—Khoury College of Computer Sciences

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Essentials of Data Science	4
Optional Co-op		
CS 6964	Co-op Work Experience	0

Statistical Theory and Modeling Concentration—College of Science

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
Optional Co-op		
EESC 6500	Pathways to Professional Success	1
EESC 6964	Co-op Work Experience	0

Operations Research, MSOR (Boston)

This program seeks to train students in the basic techniques and theory of operations research and their applications to real-world problems. Graduates should have developed their analytical skills to attack complex, large-scale optimization problems of both a deterministic and stochastic nature. Eight 4-semester-hour graduate courses are required for this degree. Previous course work will be evaluated to determine proficiency in certain content areas and degree plan may be tailored accordingly. In some cases, a student may be required to take an assessment exam to determine content and knowledge proficiency. No course can be used to satisfy both a requirement and an elective. To qualify for degree conferral, a minimum cumulative grade-point average of 3.000, equivalent to a grade of B, must be obtained. Some courses listed for this program are offered in the College of Engineering or the Khoury College of Computer Sciences.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Probability		
Complete 4 semester hours from the following:		4
MATH 7241	Probability 1	
MATH 7341	Probability 2	
OR 7230	Probabilistic Operation Research	
Statistics		
MATH 7342	Mathematical Statistics	4
or MATH 7343	Applied Statistics	
Operations Research		
OR 6205	Deterministic Operations Research	4
Optimization and Complexity		
MATH 7234	Optimization and Complexity	4

Electives

Code	Title	Hours
Complete 16 semester hours from the following:		16
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 7805	Complexity Theory	
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6205	Concepts of Object-Oriented Design with C++	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5500	Systems Engineering in Public Programs	
IE 5617	Lean Concepts and Applications	
IE 5630	Biosensor and Human Behavior Measurement	
IE 6300	Manufacturing Systems Design	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7315	Human Factors Engineering	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	

MATH 7223	Riemannian Optimization
MATH 7233	Graph Theory
MATH 7243	Machine Learning and Statistical Learning Theory 1
MATH 7339	Machine Learning and Statistical Learning Theory 2
MATH 7344	Regression, ANOVA, and Design
OR 7240	Integer and Nonlinear Optimization
OR 7310	Logistics, Warehousing, and Scheduling

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

Applied Mathematics, Graduate Certificate (Boston)

Large streams of data have brought mathematical modeling to nearly every field and industry. More than ever, a deep understanding of the fundamentals and applications of these models is the differentiator between the success and failure of projects in statistics, machine learning, probabilistic modeling, and optimization. From constructing financial tools and optimizing supply chains, to computer-guided brain surgery and to quantum computing, a foundational understanding of advanced mathematics can give you the tools to create the ideas and technology that will drive the 21st century.

A graduate certificate in applied mathematics gives you the opportunity to study the fundamentals of statistical reasoning, mathematical modeling, and modern mathematical methods in a Tier 1 research department. Shorter than the full master's, the graduate certificate allows you to take up to four courses from the Department of Mathematics. Our courses cover a wide range of topics, from theory courses about the fundamental structures of mathematical objects, to project-based applied courses where students use modeling to solve research-level problems from academic and industry partners.

All applied mathematics courses are taught in the evening to accommodate working students. Mathematics and pure math courses also count toward this certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Modeling		
Complete 4 semester hours from the following:		
MATH 5110	Applied Linear Algebra and Matrix Analysis	
MATH 5131	Introduction to Mathematical Methods and Modeling	
MATH 7203	Numerical Analysis 1	
MATH 7233	Graph Theory	
MATH 7241	Probability 1	
Statistics		
Complete 4 semester hours from the following:		
MATH 7243	Machine Learning and Statistical Learning Theory 1	
MATH 7343	Applied Statistics	

Electives

Code	Title	Hours
Complete 8 semester hours from subject area MATH, including but not limited to the following:		
MATH 5101	Analysis 1: Functions of One Variable	
MATH 5111	Algebra 1	
MATH 7202	Partial Differential Equations 1	
MATH 7205	Numerical Analysis 2	
MATH 7223	Riemannian Optimization	
MATH 7234	Optimization and Complexity	
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	

MATH 7343

Applied Statistics

MATH 7344

Regression, ANOVA, and Design

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Physics

Website (<https://cos.northeastern.edu/physics/>)

Mark Williams, PhD

Professor and Chair

110 Dana Research Center

617.373.2902

617.373.2943 (fax)

gradphysics@northeastern.edu

Physics PhD and Master of Science students at Northeastern University have the opportunity to explore, discover, and apply the fundamental principles that guide the universe. The program specializes in several subfields that reflect the forefront research activities of the department. These specializations include biological physics, condensed matter physics, elementary particle physics, astrophysics, nanomedicine, nanophysics, quantum science, and network science.

The Department of Physics also offers a Graduate Certificate in Nanomedicine. The certificate is designed for students, engineers, and physicians to develop competency and practical skills in the application of nanotechnology to problems in medicine. This program is appropriate for those working in or seeking careers in biotechnology, pharmaceutical, biomedical, or clinical fields.

Programs

Doctor of Philosophy (PhD)

- Physics (p. 1193) (Boston)
- Physics, PhD—Advanced Entry (p. 1197) (Boston)

Master of Science (MS)

- Applied Physics and Engineering (p. 557) (Boston)
- Complex Network Analysis (p. 166) (Boston)
- Nanomedicine (p. 1205) (Boston)
- Physics (p. 1209) (Boston)

Graduate Certificate

- Nanomedicine (p. 1211) (Boston)

Physics, PhD (Boston)

The Department of Physics offers a Doctor of Philosophy in Physics with specializations in different subfields that reflect the forefront research activities of the department including biological physics, condensed matter physics, elementary particle physics, astrophysics, nanomedicine, and network science. The program for the PhD degree consists of the required coursework, the proficiency exams, a preliminary research seminar, the completion of a dissertation based upon original research performed by the student, and a dissertation defense upon completion of the dissertation. Based on these measures, students are expected to obtain a graduate-level understanding of basic physics concepts and demonstrate the ability to formulate a research plan, communicate orally, and do research.

Entrance with a Bachelor's Degree

COURSEWORK

The required courses are grouped into two sets, Part 1 and Part 2, having a total of 42 semester hours as a minimum. Part 1 courses (first-year courses) are taken prior to the proficiency exam. Students without a master's degree must complete all Part 1 courses in the first year to remain in good academic standing in the graduate program. Part 2 courses (second-year courses) may be taken before or after passing the proficiency exam.

See Core Course Requirements and Program of Study for course details. Students with a master's degree should see Advanced Entry Program Requirements.

GRADE REQUIREMENTS

The minimum grade required for the successful completion of the Part 1 courses is a B (3.000) average. Students will only be allowed to take the proficiency exam if they fulfill this requirement. The minimum grade required for the successful completion of Part 2 (excluding advanced research)

is at least a B (3.000) average for the Part 2 courses. The Part 2 courses, including any makeup of grade-point-average deficiencies (see following), must be completed within two calendar years of passing the proficiency exam. The department expects students to complete the bulk of these courses in the first year after the proficiency exam. The cumulative average will be calculated each semester. No more than two courses or 8 semester hours of credit, whichever is greater, may be repeated in order to satisfy the requirement for the PhD degree. A student who does not maintain a 3.000 cumulative average for two consecutive semesters, or is otherwise not making satisfactory progress toward the PhD degree requirements, may be recommended for termination at the discretion of the graduate committee. Within the above limitations, a required course for which a grade of F is received must be repeated with a grade of C or better and may be repeated only once. In calculating the overall cumulative average, all graduate-level coursework completed at the time of clearance for graduation will be counted.

PROFICIENCY EXAM REQUIREMENT

A student who fails to achieve the required B average for the Part 1 courses must petition the graduate committee in order to remain in the graduate program and be eligible to take the proficiency exam. All students registered in the PhD program are required to pass a written proficiency exam, unless they are granted an exemption (see below).

The proficiency exam consists of four parts, which are based on the first-year courses. An exemption for each part is granted if a B, or higher, is earned in the corresponding course (listed below in parentheses). Exam exemptions are only granted based on courses taken at Northeastern University.

- Classical Mechanics and Mathematical Methods (Classical Mechanics/Math Methods (PHYS 7301))
- Electricity and Magnetism (Electromagnetic Theory (PHYS 7302))
- Statistical Mechanics (Statistical Physics (PHYS 7305))
- Quantum Mechanics (Quantum Theory 2 (PHYS 7316))

The proficiency exam is given twice yearly: once prior to the start of the fall semester and again within the first two weeks of the start of the spring semester. Each part consists of a three-hour written exam, and no student will be required to take multiple parts on the same day.

All students enrolled in the PhD program must take the fall proficiency exam after completing their first-year course of study with the required GPA unless they are granted a waiver. Unless exempted, students taking the exam for the first time must take all parts. A student who does not pass the exam on their first attempt must pass the exam the next time it is given in order to continue in the PhD program. Any part passed on the first attempt does not need to be repeated.

PHD CANDIDACY

Degree candidacy is established when the student has passed (or exempted) the proficiency examination and completed both the Part 1 and Part 2 course requirements. PhD candidacy may be achieved before completion of the advanced elective if the elective in the student's specialization is not offered in a given year. The elective must be taken at the next opportunity. PhD degree candidacy is certified by the college. A maximum of five years after the establishment of doctoral degree candidacy is allowed for the completion of degree requirements.

PhD Dissertation Requirement

All PhD students are required to complete a dissertation based upon new and original research in one of the three following options:

- In one of the current theoretical or experimental research programs in the department, under direct supervision of an advisor from the Department of Physics. A dissertation committee will be formed consisting of the advisor; two full-time members of the department; and an additional member, either from within the department or from an outside department or institution.
- In a recognized interdisciplinary field involving another research area of the university, under the direct supervision of a faculty member in that field. In this case, an interdisciplinary committee is formed under the approval of the graduate committee, consisting of the direct supervisor, a departmental advisor, one other member of the department, and an additional member of either the department or the external department.
- In an area of applied research in one of the industrial or high-technology laboratories associated with the department's industrial PhD program. The direct supervisor is associated with the institution where the research is performed. In this case, a dissertation advisory committee is established by the graduate committee, consisting of the direct supervisor, the departmental advisor, and two other members of the department.

PhD students must select their departmental advisor no later than the end of the spring semester of their second year or their second semester after having passed the proficiency examination, whichever comes first. This process should start as soon as the student has identified a field of research or has passed the proficiency exam.

PHD DISSERTATION COMMITTEE, PRELIMINARY THESIS PROPOSAL, AND PRELIMINARY RESEARCH SEMINAR

By the end of the spring semester of the third year or the second semester in which the student is enrolled for PhD dissertation, whichever comes first, each PhD student must have an approved dissertation committee and thesis proposal.

The student (with the aid and approval of their thesis advisor) will submit a PhD thesis proposal to the graduate committee clearly outlining a plan to carry out new and original research in the context of previously published research in the scientific literature and also describe the methodologies to be employed. The thesis proposal is limited to 15 pages or less, including references. A proposed makeup of the dissertation committee will be submitted at the same time.

The graduate committee will evaluate the merit of the proposal and make recommendations for improvements when necessary, including any changes to the composition of the dissertation committee. No more than two submissions for a particular proposal may be made. In the case where a revised

proposal does not meet a minimum academic standard that provides a basis for making such improvements, the graduate committee may instruct the student to select a different thesis topic or advisor.

After approval by the graduate committee, the proposal is circulated to the general faculty for comments. If the graduate coordinator receives any objections, the proposal will be referred back to the graduate committee for final resolution.

After the proposal and dissertation committee have been approved, the student will make a public presentation of the material in the preliminary research seminar before the dissertation committee in a format open to the full department and advertised one week in advance. The dissertation committee will then meet in closed session to evaluate the seminar. The preliminary research seminar must take place no later than the semester after the thesis proposal is approved and, normally, in the same semester.

In the event that the dissertation advisor is changed, a new committee must be formed, with the approval of the graduate committee, and a new preliminary research seminar given.

PHD DISSERTATION DEFENSE

The dissertation defense consists of a public presentation, followed by a question period conducted by the dissertation committee and limited to them and the department faculty. The date of the dissertation presentation must be publicized and a copy of the thesis deposited with the graduate program coordinator at least one week prior to the defense. If during this posting period or in the two business days following the defense a written objection to the thesis is lodged with the department chair by a member of the faculty, the chair may appoint an ad hoc postdefense review committee to provide advice on the scientific issues raised by the objection. Students should note that they must be registered for Dissertation or Dissertation Continuation during the semester in which they defend their dissertation and that they should schedule their defenses well in advance of the end of the semester in order to accommodate the review/waiting period and the time required to deposit the thesis.

The final dissertation defense is held in accordance with the College of Science regulations.

PhD Specialization Options

Students choose a specialization in biological physics; particle physics; condensed matter physics; or, with preapproval of a faculty member, in the following areas: nanomedicine or network science.

Multiple specializations are allowed if the individual requirements for each specialization are met.

Note that the specialization will not appear on the degree diploma or on the official transcript but can be listed as the field of study on CVs and grant proposals.

Transfer Credit

Students must petition in writing through the graduate committee to the director of graduate student services for all transfer credit. A copy of an official transcript must be attached to the Request for Transfer Credit form. A maximum of 9 semester hours of credit obtained at another institution may be accepted toward the PhD degree provided that the credits transferred consist of a grade of B or better, are graduate-level courses, have been earned at an accredited institution, and have not been used toward any other degree. Grades are not transferred.

Course Waivers

Course waivers may be accepted toward the PhD degree course requirements, though they will not change the number of credits required for the program. The student must have received a B grade or better in equivalent graduate-level core courses that have been earned at an accredited institution. Students must petition in writing to the graduate committee for all course waivers and provide documentation in the form of official transcripts to support their petition.

Residence Requirement

The residence requirement is satisfied by at least one year of full-time graduate work (i.e., enrollment in PhD Dissertation, for two consecutive semesters). Students must be continually enrolled throughout the pursuit of the dissertation.

Internship Option

A PhD candidate may spend one year in a participating high-technology, industrial, or government laboratory immediately after passing the PhD proficiency examination. In this program, the student is expected to remain in touch with the university by taking one course per semester at the university and by frequent contact with a faculty advisor. After the one-year paid internship, the student returns to the university to do the dissertation. Eligibility for this program is contingent on acceptance both by the department and by the external laboratory.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Coursework

Proficiency examinations (completed or exempted)

Annual review

Candidacy

Preliminary research seminar proposal with proposed dissertation committee

Preliminary research seminar talk
Dissertation defense

Core Course Requirements ¹

Code	Title	Hours
PHYS 5318	Principles of Experimental Physics	4
PHYS 7210	Introduction to Research in Physics (Take this repeatable course twice)	0
PHYS 7301	Classical Mechanics/Math Methods	4
PHYS 7302	Electromagnetic Theory	4
PHYS 7305	Statistical Physics	4
PHYS 7315	Quantum Theory 1	4
PHYS 7316	Quantum Theory 2	4
PHYS 7321	Computational Physics	4
PHYS 9984	Advanced Research	1-8

Electives

Code	Title	Hours

Introductory Electives

If preapproved to specialize in nanomedicine or network science, consult program director.

Complete 8 semester hours from the following: 8

PHYS 7322	Nonequilibrium Physics	
PHYS 7323	Elementary Particle Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7325	Quantum Field Theory 1	
PHYS 7731	Physics of Biological Processes and Living Systems 1	

Advanced Elective

Complete 4 semester hours from the following: 4

PHYS 7733	Topics: Elementary Particle Physics and Cosmology	
PHYS 7734	Topics: Condensed Matter Physics	
PHYS 7741	Physics of Biological Processes and Living Systems 2	

PhD Specialization Options

- A specialization is required.²
- Courses completed in fulfillment of a specialization may also fulfill the elective requirements above.
- A specialization in nanomedicine or network science requires prior approval.

Code	Title	Hours
Biological Physics ³		
PHYS 7731	Physics of Biological Processes and Living Systems 1	4
PHYS 7741	Physics of Biological Processes and Living Systems 2	4
Particle Physics ⁴		
PHYS 7323	Elementary Particle Physics	4
PHYS 7733	Topics: Elementary Particle Physics and Cosmology	4
Condensed Matter Physics		
PHYS 7324	Condensed Matter Physics	4
PHYS 7734	Topics: Condensed Matter Physics	4
Nanomedicine		
NNMD 5270	Foundations in Nanomedicine: Therapeutics	3
NNMD 5370	Nanomedicine Research Techniques	4
Network Science		
PHYS 5116	Network Science 1	4
PHYS 7335	Dynamical Processes in Complex Networks	4

Dissertation

Code	Title	Hours
Taken third year and beyond.		
PHYS 9990	Dissertation Term 1	
PHYS 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
PHYS 9996	Dissertation Continuation	

Program Credit/GPA Requirements

42 total semester hours required
Minimum 3.000 GPA required

- 1

Methods for Teaching in the Introductory Physics Laboratory 1 (PHYS 7220) and Methods for Teaching Introductory Physics Laboratory 2 (PHYS 7230) are required for students awarded a Teaching Assistantship.
- 2

Note that the specialization will not appear on the degree diploma or on the official transcript but can be listed as the field of study on CVs and grant proposals. The two courses under specialization include one of the electives previously listed above.
- 3

By approval of the graduate committee, biological physics students may substitute graduate courses in biology, physics, or chemistry from the following list instead of Physics of Biological Processes and Living Systems 2 (PHYS 7741):
 - Biochemistry (BIOL 6300)
 - Molecular Cell Biology (BIOL 6301)
 - Molecular Modeling (CHEM 5638)
 - Additional appropriate courses may also be substituted by approval of the physics graduate committee.
- 4

Elementary Particle Physics (PHYS 7323) is required for a specialization in particle physics. The advanced elective may be Topics: Elementary Particle Physics and Cosmology (PHYS 7733).

Plan of Study

Sample Plan of Study

FALL TERM ENTRANCE¹

Year 1			
Fall	Hours	Spring	Hours
PHYS 7210		0 PHYS 5318	4
PHYS 7301		4 PHYS 7210	0
PHYS 7302		4 PHYS 7305	4
PHYS 7315		4 PHYS 7316	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
PHYS 7321		4 PHYS 9984	2-8
Electives		8 Advanced elective	4
		12	6-12
Year 3			
Fall	Hours	Spring	Hours
PHYS 9990		0 PHYS 9991	0
		0	0

Total Hours: 42-48

¹ Program completed with successful submission and defense of dissertation.

Physics, PhD—Advanced Entry (Boston)

The Department of Physics offers a Doctor of Philosophy in Physics with specializations in different subfields that reflect the forefront of research activities of the department including biological physics, condensed matter physics, elementary particle physics, nanomedicine, and network science. The program for the PhD degree consists of the required coursework, a proficiency examination, a preliminary research seminar, the completion of a dissertation based upon original research performed by the student, and a dissertation defense upon completion of the dissertation. Based on these

measures, students are expected to obtain a graduate-level understanding of basic physics concepts and demonstrate the ability to formulate a research plan, communicate orally a research plan, and conduct and present independent research.

Coursework

Students entering with a master's degree from a U.S. institution in physics or a related area approved by the department will be required to take 10 semester hours of courses. The courses will be determined by the graduate director based on the student's transcripts. Students entering with a MS degree awarded by an institution outside the United States will need to consult the graduate director for a transcript evaluation to determine required coursework and course waivers.

Grade Requirements

The minimum grade required is a B (3.000) average. A student who does not maintain a 3.000 cumulative average for two consecutive semesters, or is otherwise not making satisfactory progress toward the PhD degree requirements, may be recommended for termination at the discretion of the graduate committee.

Proficiency Exam Requirement

All students registered in the PhD program are required to pass a written proficiency exam, unless they are granted a waiver (see below). Students who enter with a master's degree from a U.S. institution may take any/all parts of the exam, at the first opportunity upon entering the program in the fall. In this case, the exam will count as a first attempt only if the student submits the exam to the examiner.

The proficiency exam consists of four parts, which are based on the first-year courses. A waiver for each part is granted if a B, or higher, is earned in the corresponding course (listed below in parentheses). Exam waivers are only granted based on courses taken at Northeastern University.

- Classical Mechanics/Math Methods (PHYS 7301)
- Electromagnetic Theory (PHYS 7302)
- Statistical Physics (PHYS 7305)
- Quantum Theory 2 (PHYS 7316)

The proficiency exam is given twice yearly: once prior to the start of the fall semester and again within the first two weeks of the start of the spring semester. Each part consists of a three-hour written exam, and no student will be required to take multiple parts on the same day.

All students enrolled in the PhD program must take the fall proficiency exam after completing their first-year course of study with the required grade-point average unless they are granted a waiver. Unless waived, students taking the exam for the first time must take all parts. A student who does not pass the exam on their first attempt must pass the exam the next time it is given in order to continue in the PhD program. Any part passed on the first attempt does not need to be repeated.

PhD Candidacy

Degree candidacy is established when the student has passed the proficiency examination and completed 10 semester hours of courses. PhD degree candidacy is certified by the college. A maximum of five years after the establishment of doctoral degree candidacy is allowed for the completion of degree requirements.

PhD Dissertation Requirement

All PhD students are required to complete a dissertation based upon new and original research in one of the three following options:

- In one of the current theoretical or experimental research programs in the department, under direct supervision of an advisor from the Department of Physics. A dissertation committee will be formed consisting of the advisor; two full-time members of the department; and an additional member, either from within the department or from an outside department or institution.
- In a recognized interdisciplinary field involving another research area of the university, under the direct supervision of a faculty member in that field. In this case, an interdisciplinary committee is formed under the approval of the graduate committee, consisting of the direct supervisor, a departmental advisor, one other member of the department, and an additional member of either the department or the external department.
- In an area of applied research in one of the industrial or high-technology laboratories associated with the department's industrial PhD program. The direct supervisor is associated with the institution where the research is performed. In this case, a dissertation advisory committee is established by the graduate committee, consisting of the direct supervisor, the departmental advisor, and two other members of the department.

PhD students must select their departmental advisor no later than the end of the spring semester of their second year or their second semester after having passed the proficiency examination, whichever comes first. This process should start as soon as the student has identified a field of research or has passed the proficiency exam.

PhD Dissertation Committee, Preliminary Thesis Proposal, and Preliminary Research Seminar

By the end of the spring semester of the third year or the second semester in which the student is enrolled for PhD dissertation, whichever comes first, each PhD student must have an approved dissertation committee and thesis proposal.

The student (with the aid and approval of their thesis advisor) will submit a PhD thesis proposal to the graduate committee clearly outlining a plan to carry out new and original research in the context of previously published research in the scientific literature and also describe the methodologies

to be employed. The thesis proposal is limited to 15 pages or less, including references. A proposed makeup of the dissertation committee will be submitted at the same time.

The graduate committee will evaluate the merit of the proposal and make recommendations for improvements when necessary, including any changes to the composition of the dissertation committee. No more than two submissions for a particular proposal may be made. In the case where a revised proposal does not meet a minimum academic standard that provides a basis for making such improvements, the graduate committee may instruct the student to select a different thesis topic or advisor.

After approval by the graduate committee, the proposal is circulated to the general faculty for comments. If the graduate coordinator receives any objections, the proposal will be referred back to the graduate committee for final resolution.

After the proposal and dissertation committee have been approved, the student will make a public presentation of the material in the preliminary research seminar before the dissertation committee in a format open to the full department and advertised one week in advance. The dissertation committee will then meet in closed session to evaluate the seminar. The preliminary research seminar must take place no later than the semester after the thesis proposal is approved and, normally, in the same semester.

In the event that the dissertation advisor is changed, a new committee must be formed, with the approval of the graduate committee, and a new preliminary research seminar given.

PhD Dissertation Defense

The dissertation defense consists of a public presentation, followed by a question period conducted by the dissertation committee and limited to them and the department faculty. The date of the dissertation presentation must be publicized and a copy of the thesis deposited with the graduate program coordinator at least one week prior to the defense. If during this posting period or in the two business days following the defense a written objection to the thesis is lodged with the department chair by a member of the faculty, the chair may appoint an ad hoc postdefense review committee to provide advice on the scientific issues raised by the objection. Students should note that they must be registered for Dissertation or Dissertation Continuation during the semester in which they defend their dissertation and that they should schedule their defenses well in advance of the end of the semester in order to accommodate the review/waiting period and the time required to deposit the thesis.

The final dissertation defense is held in accordance with the College of Science regulations.

Residence Requirement

The residence requirement is satisfied by at least one year of full-time graduate work (i.e., enrollment in PhD Dissertation, for two consecutive semesters). Students must be continually enrolled throughout the pursuit of the dissertation.

Internship Option

A PhD candidate may spend one year in a participating high-technology, industrial, or government laboratory immediately after passing the PhD proficiency examination. In this program, the student is expected to remain in touch with the university by taking one course per semester at the university and by frequent contact with a faculty advisor. After the one-year paid internship, the student returns to the university to do the dissertation. Eligibility for this program is contingent on acceptance both by the department and by the external laboratory.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Coursework
 Proficiency examinations (completed or waived)
 Annual review
 Candidacy
 Preliminary research seminar proposal with proposed dissertation committee
 Preliminary research seminar talk
 Dissertation defense

Core Requirements

Code	Title	Hours
Complete 10 semester hours of coursework. The courses required will be determined by the graduate program director based on the student's transcripts. ¹		10

Dissertation

Code	Title	Hours
PHYS 9990	Dissertation Term 1	
PHYS 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
PHYS 9996	Dissertation Continuation	

Program Credit/GPA Requirements

10 total semester hours required

Minimum 3.000 GPA required

¹ Methods for Teaching in the Introductory Physics Laboratory 1 (PHYS 7220) is required for students awarded a teaching assistantship.

Applied Physics and Engineering, MS (Boston)

The combined MS program in applied physics and engineering allows graduate students to receive training in one of three concentrations of the electrical and computer engineering department while also receiving fundamental graduate-level physics training that is relevant to that area.

Thesis Option

Students may register for an additional two semesters of thesis work. Depending on the affiliation of the thesis advisor, students may register for Thesis (PHYS 7990) for a total of 8 semester hours or 4 semester hours of Master’s Project (EECE 7945) followed by 4 semester hours of Thesis (EECE 7990). Thesis credits cannot be substituted for any of the coursework listed above. This option requires a total of 40 semester hours for the master’s degree. A thesis committee is composed of an advisor and two faculty members from physics or electrical engineering.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Concentrations

Complete one of the following concentrations:

- Analysis, Modeling, and Computation (p. 558)
- Electromagnetics, Plasma, and Optics (p. 558)
- Microsystems, Materials, and Devices (p. 559)

Optional Thesis

Code	Title	Hours
Select one of the following options based on the college affiliation of the thesis advisor. Thesis coursework will not be applied to other requirements of this degree program. Completion of this thesis option requires a total of 40 semester hours to earn the degree:		8

Option 1 (College of Science thesis advisor)		
PHYS 7990	Thesis (completed twice over two semesters)	
Option 2 (College of Engineering thesis advisor)		
EECE 7945	Master’s Project	
EECE 7990	Thesis	

Program Credit/GPA Requirements

32 total semester hours required (40 with optional thesis)

Minimum 3.000 GPA required

ANALYSIS, MODELING, AND COMPUTATION		
Code	Title	Hours
Core Courses		
EECE 7205	Fundamentals of Computer Engineering	4
PHYS 7321	Computational Physics	4
Engineering Coursework		
Complete 12 semester hours from the following:		12
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7271	Computational Methods in Electromagnetics	

EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7374	Fundamentals of Computer Networks

Physics Coursework

Complete 12 semester hours from the following: 12

PHYS 5116	Network Science 1
PHYS 5318	Principles of Experimental Physics
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7305	Statistical Physics
PHYS 7335	Dynamical Processes in Complex Networks

ELECTROMAGNETICS, PLASMA, AND OPTICS

Code	Title	Hours
Core Courses		
EECE 7203	Complex Variable Theory and Differential Equations	4
PHYS 7302	Electromagnetic Theory	4

Engineering Coursework

Complete 12 semester hours from the following: 12

EECE 5698	Special Topics in Electrical and Computer Engineering (Subsurface Imaging)
EECE 7105	Optics for Engineers
EECE 7202	Electromagnetic Theory 1
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7293	Modern Imaging

Physics Coursework

Complete 12 semester hours from the following: 12

PHYS 5318	Principles of Experimental Physics
PHYS 7305	Statistical Physics
PHYS 7315	Quantum Theory 1
PHYS 7316	Quantum Theory 2
PHYS 7321	Computational Physics
PHYS 7324	Condensed Matter Physics
PHYS 7731	Physics of Biological Processes and Living Systems 1

MICROSYSTEMS, MATERIALS, AND DEVICES

Code	Title	Hours
Core Courses		
EECE 7201	Solid State Devices	4
PHYS 7324	Condensed Matter Physics	4

Engineering Coursework

Complete 12 semester hours from the following: 12

EECE 5606	Micro- and Nanofabrication
EECE 5680	Electric Drives
EECE 7204	Applied Probability and Stochastic Processes
EECE 7240	Analog Integrated Circuit Design
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7353	VLSI Design
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering

Physics Coursework

Complete 12 semester hours from the following: 12

PHYS 5318	Principles of Experimental Physics
PHYS 7301	Classical Mechanics/Math Methods

PHYS 7302	Electromagnetic Theory
PHYS 7305	Statistical Physics
PHYS 7315	Quantum Theory 1
PHYS 7316	Quantum Theory 2
PHYS 7321	Computational Physics
PHYS 7734	Topics: Condensed Matter Physics

Complex Network Analysis, MS (Boston)

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master's degree program in complex network analysis methodologies. The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business
4. Biological systems modeling used across research and industry including network biology, drug discovery, or multi-omics mining

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Biological Networks—College of Science
- Complex Social Systems—College of Social Sciences and Humanities
- Economic and Technological Networks—Khoury College of Computer Sciences
- Population Health Dynamics—Bouv  College of Health Sciences

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CNET 5050	Fundamentals of Complex Networks	4
CNET 5051	Analyzing Complex Network Data	4
CNET 5052	Advanced Tools for Complex Network Analysis	4
CNET 5901	Visualizing Complex Networks	2
CNET 5902	Communicating Network Data	2

Concentrations

Complete one of the following concentrations:

- Complex Biological Networks (p. 167)—College of Science
- Complex Social Systems (p. 168)—College of Social Sciences and Humanities
- Economic and Technological Networks (p. 168)—Khoury College of Computer Sciences
- Population Health Dynamics (p. 169)—Bouv  College of Health Sciences

Experiential Courses

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		4
CNET 6107	Complex Network Analysis Research Rotation	

CNET 6108	Complex Network Analysis Capstone
CNET 6990	Thesis

Optional Co-op

Code	Title	Hours
CNET 6000	Professional Development for Co-op	1
CNET 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

Minimum 33 total semester hours required

Additional hours may be required based on student choice of courses or concentration.

One semester hour of additional coursework is required for participation in co-op.

Minimum 3.000 GPA required

CONCENTRATION IN COMPLEX BIOLOGICAL NETWORKS—COLLEGE OF SCIENCE

Code	Title	Hours

A minimum of 16 semester hours is required to complete this concentration.

Required

CNET 5515	Complex Network Analysis for Biological Systems	4

Complete 8 semester hours from the following:		8

BINF 6308	Bioinformatics Computational Methods 1	
BINF 6310	Introduction to Bioinformatics	
EEMB 5130	Population Dynamics	
ENVR 5450	Applied Social-Ecological Systems Modeling	
MATH 5131	Introduction to Mathematical Methods and Modeling	
MATH 7340	Statistics for Bioinformatics	
PHYS 5211	Introduction to Scientific Computing	

Complete 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4

CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5314	Complexity in Social Systems	
CNET 5411	Financial and Economic Networks	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN COMPLEX SOCIAL SYSTEMS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours

A minimum of 13 semester hours is required to complete this concentration.

Required

CNET 5314	Complexity in Social Systems	3

Complete a minimum of 6 semester hours from the following:		6

CNET 5311	Physical and Digital Human Traces	
CNET 5360	Research Design for Social Networks	
INSH 5301	Introduction to Computational Statistics	
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	
INSH 6300	Research Methods in the Social Sciences	
INSH 6304	Modeling and Analyzing Social Networks	
INSH 6406	Analyzing Complex Digitized Data	
INSH 6500	Statistical Analysis	
PHYS 5211	Introduction to Scientific Computing	
PPUA 5262	Big Data for Cities	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section): **4**

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5411	Financial and Economic Networks
CNET 5515	Complex Network Analysis for Biological Systems
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CNET 6099	Special Topics in Complex Networks

CONCENTRATION IN ECONOMIC AND TECHNOLOGICAL NETWORKS—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours

A minimum of 14 semester hours is required to complete this concentration.

Required

CNET 5411	Financial and Economic Networks	3

Complete a minimum of 7 semester hours from the following: **7**

CS 7150	Deep Learning
CS 7200	Statistical Methods for Computer Science
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
MISM 6212	Data Mining and Machine Learning for Business
PHYS 5211	Introduction to Scientific Computing

Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section): **4**

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5314	Complexity in Social Systems
CNET 5515	Complex Network Analysis for Biological Systems
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CNET 6099	Special Topics in Complex Networks

CONCENTRATION IN POPULATION HEALTH DYNAMICS—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours

A minimum of 14 semester hours is required to complete this concentration.

Required

CNET 5126	Spreading on Networks: From Epidemics to Memes	4

Complete a minimum of 6 semester hours from the following: **6**

BINF 6308	Bioinformatics Computational Methods 1
PHTH 5210	Biostatistics in Public Health
PHTH 6210	Applied Regression Analysis
PHTH 6224	Social Epidemiology
PHTH 6440	Advanced Methods in Biostatistics
PHTH 6800	Causal Inference in Public Health Research
PHTH 6801	Causal Inference 1
PHYS 5211	Introduction to Scientific Computing

Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section): **4**

CNET 5314	Complexity in Social Systems
CNET 5411	Financial and Economic Networks
CNET 5515	Complex Network Analysis for Biological Systems
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CNET 6099	Special Topics in Complex Networks

Nanomedicine, MS (Boston)

Overview

The Master of Science in Nanomedicine is a flexible, interdisciplinary, industry-aligned professional master's degree program. It is designed for scientists, engineers, and clinicians who want to develop competencies and skills in nanomedicine research, innovation, and commercialization. Our students receive hands-on training in nanomedicine challenges and opportunities, research tools and techniques, and translation from bench to bedside. The curriculum integrates immersive individual and team-based research projects with a full-time industry co-op or laboratory experience to prepare graduates for high-demand research and entrepreneurship roles in biotechnology, pharmaceutical, biomedical, and healthcare industries.

This two-year, full-time master's program consists of eight core courses and year-round professional seminars. In year two, students tailor their curriculum by selecting a concentration and at least one experiential learning opportunity. A reflection capstone course is taken concurrently with co-op or during the final semester of study. Students seeking additional course and co-op flexibility may substitute an electives only program plan in place of a concentration.

Concentration in Nanoformulation Research

The nanoformulation research concentration integrates nanoparticle design, formulation, characterization, and translation. Students gain experience in nanomedicine theory, materials and methods, advanced laboratory techniques, and state-of-the-art instrumentation through a combination of expert-led lectures, instrument demonstrations, and collaborative interdisciplinary project-based laboratory experiences. Students have an opportunity to acquire research and project management skills for roles in research, development, and manufacturing.

Concentration in Translation and Commercialization

The translation and commercialization concentration studies scientific discovery, business, and management from the perspective of delivering nanomedicine products to patients. Students build real-world knowledge and skills in innovation, business development, and regulatory affairs—from initial discovery and research and development to FDA approval and launch—through a combination of case studies, industry-mentored projects, and creation of a virtual startup company.

Concentration in Vaccine Development Concentration

Innovations in nanoparticle-based vaccine delivery during the SARS-CoV-2 pandemic have fundamentally changed the way we develop and test vaccines. The vaccine development concentration provides training in scientific, business, and regulatory principals of vaccine research and development. Students integrate molecular tools for vaccine design, knowledge of vaccine-tissue interactions, and best practices for biopharmaceutical cell culture and manufacturing to develop the industry-aligned skills needed at the forefront of vaccine development.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
EESC 6500	Pathways to Professional Success	1
NNMD 5270	Foundations in Nanomedicine: Therapeutics	3
NNMD 5271	Foundations in Nanomedicine: Diagnostics	3
NNMD 5310	Bioethics in the Age of Artificial Intelligence	1
NNMD 5570	Preclinical and Clinical Study Design	3
NNMD 6272	Professional Nanomedicine Seminar	0
PHSC 5560	Nanotoxicity	3
PHSC 6214	Experimental Design and Biostatistics	2
or BIOT 6214	Experimental Design and Biostatistics	
Experiential Learning and Reflection		
NNMD 7500	Reflection Capstone	0
Complete at least one of the following (credit-bearing courses chosen to fulfill this requirement will also be applied to the elective requirements of this program):		
EESC 6954	Co-op Work Experience - Half-Time	
EESC 6964	Co-op Work Experience	
EESC 6965	Co-op Work Experience Abroad	
NNMD 6370	Nanomedicine Experiential Capstone	
NNMD 6984	Independent Research	

Concentration or Electives Option

A concentration is not required. Students may complete electives in lieu of a concentration.

- Nanoformulation Research (p. 1206)
- Translation and Commercialization (p. 1206)
- Vaccine Development (p. 1206)
- Electives Option (p. 1206)

Program Credit/GPA Requirements

34 total semester hours required

Minimum 3.000 GPA required

CONCENTRATION IN NANOFORMULATION RESEARCH

Code	Title	Hours
BIOE 5820	Biomaterials	4
or CHME 5631	Biomaterials Principles and Applications	
CHEM 5648	Chemical Principles and Application of Drug Metabolism and Pharmacokinetics	3
or CHEM 5610	Polymer Chemistry	
NNMD 5370	Nanomedicine Research Techniques	4
NNMD 6370	Nanomedicine Experiential Capstone	4
Electives		
Complete 3 semester hours from the electives list. (p. 1207)		3

CONCENTRATION IN TRANSLATION AND COMMERCIALIZATION

Code	Title	Hours
BIOT 5145	Biotechnology Lab Skills	1
or BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5225	Managing and Leading a Biotechnology Company	3
BIOT 6290	Foundation in Quality for Biotechnology	3
BIOT 6310	CGMP Statutes and Regulation	3
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	3
Electives		
Complete 3 semester hours from the electives list. (p. 1207)		3

CONCENTRATION IN VACCINE DEVELOPMENT

Code	Title	Hours
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	1
BIOT 5630	Cell Culture Applications for Biopharmaceuticals	2
BIOT 5910	Vaccines and Immunization	3
BIOT 5920	Foundations in Vaccine Regulatory Science	3
BIOT 5930	Molecular Tools for Vaccine Design	3
BIOT 6310	CGMP Statutes and Regulation	3
Electives		
Complete 3 semester hours from the electives list. (p. 1207)		3

ELECTIVES OPTION

Code	Title	Hours
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	3-4
or NNMD 5370	Nanomedicine Research Techniques	
Electives		
Complete 15 semester hours from the electives list. (p. 1207)		15

Electives List

Code	Title	Hours
Complete electives from the following (electives not on this list may be chosen with faculty advisor approval):		
Commercialization and Regulatory Affairs		
BIOT 5219	The Biotechnology Enterprise	
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	
BIOT 5920	Foundations in Vaccine Regulatory Science	
BIOT 6290	Foundation in Quality for Biotechnology	
BIOT 6310	CGMP Statutes and Regulation	
BIOT 6320	Design and Development of Biopharmaceuticals	
BIOT 6340	Sterile Manufacturing Operations	
CHME 5631	Biomaterials Principles and Applications	
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	
Drug Delivery		
CHEM 5648	Chemical Principles and Application of Drug Metabolism and Pharmacokinetics	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 7350	Transport Phenomena	
PMST 6252	Pharmacokinetics and Drug Metabolism	
PMST 6254	Advanced Drug Delivery Systems	
Laboratory Research		
BIOT 5145	Biotechnology Lab Skills	
BIOT 5840	Cell and Gene Therapy Lab	
NNMD 5370	Nanomedicine Research Techniques	
NNMD 5380	Electron Microscopy Techniques	
NNMD 6370	Nanomedicine Experiential Capstone	
NNMD 6984	Independent Research	
PHSC 5212	Research Skills and Ethics	
Nanomaterials Design and Application		
BIOE 5820	Biomaterials	
BIOE 6100	Medical Physiology	
BIOT 5630	Cell Culture Applications for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5910	Vaccines and Immunization	
BIOT 5930	Molecular Tools for Vaccine Design	
CHEM 5610	Polymer Chemistry	
CHEM 5640	Biopolymeric Materials	
CHME 5630	Biochemical Engineering	
CHME 5631	Biomaterials Principles and Applications	
CHME 5683	Introduction to Polymer Science	
PHSC 6216	Human Physiology and Pathophysiology	
PHSC 6290	Biophysical Methods in Drug Discovery	
PHYS 5260	Introduction to Nanoscience and Nanotechnology	
PHYS 7731	Physics of Biological Processes and Living Systems 1	

Plan of Study

Sample Plans of Study

YEAR 1

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
EESC 6500		1 NNMD 5271		3 EESC 6964 or 6965 (*)	0
NNMD 5270		3 NNMD 5570		3 (Co-op option 1: May–Aug.)	

NNMD 5310	1 NNMD 6272	0
PHSC 5560	3 PHSC 6214 or BIOT 6214	2
	8	8

Total Hours: 16

YEAR 2 CONCENTRATION IN NANOFORMULATION RESEARCH

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
BIOE 5820 or CHME 5631		4 CHEM 5648 or PMST 6252		3 EESC 6964 or 6965 (*)	0
NNMD 5370		4 NNMD 6370		4 NNMD 7500	0
NNMD 6272		0 NNMD 6272 or 7500		0 (Co-op & reflection option 2: May–Aug.)	
		Elective		3 (Co-op & reflection option 3: July–Dec.)	
		8		10	0

Total Hours: 18

CONCENTRATION IN TRANSLATION AND COMMERCIALIZATION

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
BIOT 5145 or 5220		1 BIOT 5120		3 EESC 6964 or 6965 (*)	0
BIOT 5219		2 BIOT 5225		3 NNMD 7500	0
BIOT 6310		3 NNMD 6272 or 7500		0 (Co-op & reflection option 2: May–Aug.)	
NNMD 5470		3 Elective		3 (Co-op & reflection option 3: July–Dec.)	
NNMD 6272		0			
		9		9	0

Total Hours: 18

CONCENTRATION IN VACCINE DEVELOPMENT

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
BIOT 5220		1 BIOT 5920		3 EESC 6964 or 6965 (*)	0
BIOT 5630		2 BIOT 5930		3 NNMD 7500	0
BIOT 5910		3 NNMD 6272 or 7500		0 (Co-op & reflection option 2: May–Aug.)	
BIOT 6310		3 Elective		3 (Co-op & reflection option 3: July–Dec.)	
NNMD 6272		0			
		9		9	0

Total Hours: 18

ELECTIVES OPTION

This year 2 sample plan of study shows how a student might combine electives with multiple hands-on experiential learning alternatives to co-op.

Fall	Hours	Spring	Hours
NNMD 5370		4 NNMD 6984	4
NNMD 6370		4 NNMD 7500	0
NNMD 6272		0 Elective	3
		Elective	3
		8	10

Total Hours: 18

- * Co-op is not required. Students may substitute an experiential learning course from the electives list during year 2 to satisfy the experiential learning requirement.

Physics, MS (Boston)

The Department of Physics offers a Master of Science degree with several options. The standard physics MS can be earned by taking a specified set of courses without an MS thesis. Alternatively, an MS thesis may substitute for 8 semester hours of coursework. Both of these options may be pursued either full time or part time. Upon completion of the MS degree in physics, students should be able to apply graduate-level knowledge and solve problems in the areas of electrodynamics, quantum mechanics, classical mechanics, statistical mechanics, and advanced mathematical methods.

Grade Requirements

To qualify for the MS degree, a cumulative average of 3.000, equivalent to a grade of B, must be obtained. No more than two courses or 6 semester hours of credit, whichever is greater, may be repeated in order to satisfy the requirements for the MS degree. A student who does not maintain a 3.000 cumulative average for two consecutive semesters, or is otherwise not making satisfactory progress toward the MS degree requirements, may be recommended for termination at the discretion of the graduate committee.

Within the above limitations, a required course for which a grade of F is received must be repeated with a grade of C or better and may be repeated only once. Elective courses in which an F has been received may be repeated once to obtain a C or better.

Transfer Credit

Students must petition, in writing, through the graduate committee to the director of graduate student services for all transfer credit. An official transcript must be attached to the Request for Transfer Credit form. A maximum of 9 semester hours of credit obtained at another institution may be accepted toward the MS degree provided that the credits transferred consist of a grade of B or better in graduate-level courses and have not been used toward any other degree. Grades are not transferred.

Current MS Students Interested in the PhD Program

Physics MS students interested in applying to the Physics, PhD (p. 1193) program must submit a complete application for admission.

Special Student Status

Special students are allowed to earn credit for a maximum of 12 semester hours. Students interested in taking more than 12 semester hours must make a formal application to the degree program online.

Coursework

The MS degree requires successful completion of a minimum of 32 semester hours of coursework. There are three options for the MS degree:

The first option is the standard physics MS without an MS thesis, requiring a minimum of 32 semester hours of coursework.

The second option is the standard physics MS with an MS thesis, requiring a minimum of 1 semester hour of thesis. Up to 8 semester hours of thesis can substitute for coursework.

The third option is the physics MS with thesis and specialization in applied physics, engineering physics, biophysics, chemical physics, material physics, mathematical physics, and computational physics.

Graduate students desiring the MS with thesis option should arrange a thesis with a faculty advisor. The thesis must demonstrate the individual's capacity to execute independent work based on original material. The thesis must be approved by the graduate committee. The thesis may be completed in one semester (e.g., summer semester) or in consecutive semesters. Students who have not completed their thesis after the required number of thesis credits must register for Thesis Continuation until the thesis is approved by the graduate school and submitted electronically to Proquest.

The degree requires a minimum of 32 semester hours of graduate credit. The 32 semester hours may include up to 9 semester hours of transfer credit, as approved by the department's graduate committee and the graduate school.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Computational Coursework		
PHYS 7301	Classical Mechanics/Math Methods	4
PHYS 7305	Statistical Physics	4
PHYS 7321	Computational Physics	4

Theory Coursework

PHYS 7302	Electromagnetic Theory	4
PHYS 7315	Quantum Theory 1	4
PHYS 7316	Quantum Theory 2	4

Options

- Coursework (p. 1210)
- Thesis (p. 1210)
- Thesis with specialization (p. 1210)¹

COURSEWORK OPTION

Note: In consultation with your faculty advisor, you may choose an area of specialization from physics, engineering, chemistry, biology, mathematics, psychology, or computer science. Elective courses from the Physics, PhD (p. 1193) program may substitute for these electives with advisor approval.

Code	Title	Hours
Electives		
Complete 8 semester hours from the following:		8
PHYS 5113	Particle Physics	
PHYS 5116	Network Science 1	
PHYS 5117	Advanced Astrophysics Topics	
PHYS 5118	General Relativity and Cosmology	
PHYS 5125	Advanced Quantum Mechanics	
PHYS 5260	Introduction to Nanoscience and Nanotechnology	
PHYS 5318	Principles of Experimental Physics	
PHYS 7322	Nonequilibrium Physics	
PHYS 7323	Elementary Particle Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7325	Quantum Field Theory 1	
PHYS 7731	Physics of Biological Processes and Living Systems 1	

THESIS

Code	Title	Hours
Complete 8 semester hours from the following:		8
PHYS 7990	Thesis (In consultation with your faculty advisor, any remaining semester hours may be completed with electives.)	

In consultation with your faculty advisor, any remaining semester hours may be completed with electives.

THESIS WITH SPECIALIZATION¹

Applied physics, engineering physics, biophysics, chemical physics, materials physics, mathematical physics, or computational physics.

Code	Title	Hours
Complete a minimum of 12 semester hours from the following:		12
PHYS 7990	Thesis (A minimum of 1 semester hour is required and up to 8 semester hours may be used toward the thesis option.)	

Complete a minimum of 8 semester hours of specialization coursework in consultation with your faculty advisor.

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

¹ Note that the specialization will not appear on the degree diploma or on the official transcript but can be listed as the field of study on CVs and grant proposals.

Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 7301		4 PHYS 7305	4
PHYS 7302		4 PHYS 7316	4
PHYS 7315		4 Elective (optional)	4
PHYS 7321 (can be taken year 1 or year 2)		4	
		16	12
Year 2			
Fall	Hours		
Elective or thesis		4	
Additional elective		4	
		8	
Total Hours: 36			

Nanomedicine, Graduate Certificate (Boston)

The Graduate Certificate in Nanomedicine is a part-time program designed to introduce scientists, engineers, and physicians to interdisciplinary problem solving in nanomedicine. This experiential learning program is ideal for individuals seeking careers in biotechnology, pharmaceutical, biomedical, or clinical fields. Students study both fundamental and applied aspects of nanomedicine and then apply this knowledge to designing strategies for nanomedicine innovation, translation, and commercialization. The graduate certificate consists of 8 semester hours of NNMD coursework and one elective, totaling 12 semester hours.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
NNMD 5270	Foundations in Nanomedicine: Therapeutics	3
or NNMD 5271	Foundations in Nanomedicine: Diagnostics	
Complete at least 5 semester hours from the following:		5
NNMD 5272	Nanomedicine Seminar (may be repeated)	
NNMD 5310	Bioethics in the Age of Artificial Intelligence	
NNMD 5370	Nanomedicine Research Techniques	
NNMD 5380	Electron Microscopy Techniques	
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	
NNMD 5570	Preclinical and Clinical Study Design	

Electives

Code	Title	Hours
Complete 4 semester hours of electives from the following list. Electives not on this list may be chosen with faculty advisor approval:		4
<i>Laboratory Research</i>		
BIOL 6381	Ethics in Biological Research	
BIOT 5145	Biotechnology Lab Skills	
BIOT 7245	Biotechnology Applications Laboratory	
NNMD 5370	Nanomedicine Research Techniques	
NNMD 5380	Electron Microscopy Techniques	
NNMD 5570	Preclinical and Clinical Study Design	
NNMD 6370	Nanomedicine Experiential Capstone	
NNMD 6984	Independent Research	
PHSC 5212	Research Skills and Ethics	
PHSC 6214	Experimental Design and Biostatistics	

Nanomaterials Design and Application

BIOE 5820	Biomaterials
BIOE 6100	Medical Physiology
BIOT 5630	Cell Culture Applications for Biopharmaceuticals
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations
BIOT 5910	Vaccines and Immunization
BIOT 5930	Molecular Tools for Vaccine Design
CHEM 5610	Polymer Chemistry
CHEM 5640	Biopolymeric Materials
CHME 5630	Biochemical Engineering
CHME 5631	Biomaterials Principles and Applications
CHME 5683	Introduction to Polymer Science
NNMD 5270	Foundations in Nanomedicine: Therapeutics
NNMD 5271	Foundations in Nanomedicine: Diagnostics
PHSC 6216	Human Physiology and Pathophysiology
PHSC 6290	Biophysical Methods in Drug Discovery
PHYS 5260	Introduction to Nanoscience and Nanotechnology
PHYS 7731	Physics of Biological Processes and Living Systems I

Drug Delivery

CHEM 5648	Chemical Principles and Application of Drug Metabolism and Pharmacokinetics
CHME 5160	Drug Delivery: Engineering Analysis
CHME 7350	Transport Phenomena
PHSC 5560	Nanotoxicity
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems

Commercialization and Regulatory Affairs

BIOT 5219	The Biotechnology Enterprise
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future
BIOT 5225	Managing and Leading a Biotechnology Company
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship
BIOT 5920	Foundations in Vaccine Regulatory Science
BIOT 6290	Foundation in Quality for Biotechnology
BIOT 6310	CGMP Statutes and Regulation
BIOT 6320	Design and Development of Biopharmaceuticals
BIOT 6340	Sterile Manufacturing Operations
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

PsychologyWebsite (<https://cos.northeastern.edu/psychology/>)**Rebecca Shansky, PhD**

Professor and Chair

617.373.6819

617.373.8714 (fax)

The doctoral program in the Department of Psychology offers a research-intensive environment within a supportive community of faculty and students. Its areas of research specialization include behavioral neuroscience, cognition/cognitive neuroscience, perception, and social/personality—with crosscutting themes in health, affective science, and life span development.

During the program, students complete a series of topical seminars and courses in quantitative analysis while gaining research skills through working closely with their advisors. They are also expected to develop their own research program, beginning with their master's thesis and culminating

in their dissertation. Students' professional development is supported by attending colloquia, serving as teaching assistants, and modest annual stipends for research/travel.

Programs

Doctor of Philosophy (PhD)

- Human Behavior and Sustainability Sciences (p. 1169) (Boston)
- Psychology (p. 1215) (Boston)

Human Behavior and Sustainability Sciences, PhD (Boston)

Overview

The persistent failure to integrate the social, behavioral, and cognitive sciences with ecological and geophysical sciences is a critical friction point reducing the viability and effectiveness of sustainability solutions. Therefore, a degree program that combines training in psychology with the ecological and geophysical sciences will produce boundary-breaking scholars who can accelerate sustainability solutions that are robustly informed by the results of scientific research. The proposed curriculum integrates degree requirements from existing PhD programs in psychology and marine and environmental sciences (sustainability sciences concentration), with the addition of a set of specialized core courses and integrated cross-disciplinary research training. It also allows students broad latitude in designing their specialty within the parameters of the program.

The PhD in Human Behavior and Sustainability Sciences program provides students with the following advanced coursework and training. Students must pass two examinations during the course of their graduate studies to achieve candidacy:

1. A qualifying paper that the student will write and present to their dissertation committee.
2. A proposal defense presented to the student's dissertation committee that explains the research areas that the student proposes to work in.

At the end of the program, students will defend their written dissertation, which consists of a public seminar, public question-and-answer period, and private defense of their work to their dissertation committee. Dissertation committees consist of at least four Northeastern University faculty and one external faculty member.

A cumulative grade-point average of 3.000 is required for graduation. The PhD will be awarded following submission of a dissertation, approved by the candidate's dissertation committee, to the College of Science.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Cross-Disciplinary Science (<https://catalog.northeastern.edu/graduate/science/interdisciplinary/cross-disciplinary-science-ms-bos/>) degree. Note that no students will be admitted directly into the Cross-Disciplinary Science program to pursue a master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Dissertation committee
Qualifying paper and presentation
Dissertation proposal and presentation
Candidacy
Dissertation/dissertation defense
Teaching experience

Core Requirements

Code	Title	Hours
EEMB 7103	Seminar in Sustainability Sciences	2
EEMB 8103	Readings in Sustainability Sciences	2
ENVR 5450	Applied Social-Ecological Systems Modeling	4
PSYC 5180	Quantitative Methods 1	3
PSYC 5181	Quantitative Methods 2	3
PSYC 5410 or ENVR 5410	Human Behavior and Sustainability Human Behavior and Sustainability	3

Research

Code	Title	Hours
Complete two semesters from the following:		6
PSYC 8401	Research Project	
or EEMB 8984	Research	

Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8

Psychology Breadth Courses

PSYC 5110	Cognitive Science
PSYC 5120	Proseminar in Sensation
PSYC 5130	Proseminar in Perception
PSYC 5140	Proseminar in Biology of Behavior
PSYC 5150	Proseminar in Clinical Neuroscience
PSYC 5170	Social and Affective Science

Sustainability Breadth Courses

EEMB 5130	Population Dynamics
EEMB 5506	Biology and Ecology of Fishes
EEMB 5518	Ocean and Coastal Processes
EEMB 5522	Experimental Design Marine Ecology
ENVR 5115	Advanced Topics in Environmental Geology
ENVR 5150	Climate and Atmospheric Change
ENVR 5260	Geographical Information Systems
ENVR 5350	Sustainable Energy and Climate Solutions
ENVR 5600	Coastal Processes, Adaptation, and Resilience
ENVR 5700	Streams and Watershed Ecology
ENVR 5750	Urban Ecology
ENVR 5800	Climate Adaptation and Nature-Based Solutions
ENVR 6150	Food Security and Sustainability
ENVR 6500 and ENVR 6501	Biostatistics and Lab for ENVR 6500
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
INSH 6300	Research Methods in the Social Sciences
INSH 6406	Analyzing Complex Digitized Data
INTL 5100	Climate and Development
PHTH 5214	Environmental Health
PPUA 5246	Participatory Modeling for Collaborative Decision Making
PPUA 5249	Sustainable Urban Coastal Policy
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5267	Climate Policy and Justice
PPUA 5268	International Environmental Policy

Psychology Depth Courses

PSYC 7250	Seminar in Clinical Neuroscience
PSYC 7300	Advanced Quantitative Analysis

Sustainability Depth Courses

EEMB 7101	Seminar in Marine Sciences
EEMB 7102	Seminar in Ecology and Evolutionary Biology
EEMB 7103	Seminar in Sustainability Sciences
EEMB 7104	Seminar in Geosciences
ENVR 6102	Environmental Science and Policy Seminar 2
LPSC 7312	Cities, Sustainability, and Climate Change
POLS 7334	Social Networks

PPUA 6101	Environmental Science and Policy Seminar 1
PPUA 7346	Resilient Cities
SOCL 7267	Environment, Health, and Society

Dissertation

Code	Title	Hours
Please enroll in either EEMB 9990 or PSYC 9990 for one semester after achieving candidacy. In the following semester, please enroll in either EEMB 9991 or PSYC 9991.		
EEMB 9990	Dissertation Term 1	
or PSYC 9990	Dissertation Term 1	
EEMB 9991	Dissertation Term 2	
or PSYC 9991	Dissertation Term 2	

Program Credit/GPA Requirements

31 total semester hours required

Minimum 3.000 GPA required

Psychology, PhD (Boston)

The PhD program in the Department of Psychology covers a wide spectrum of contemporary behavioral science within a close-knit community of faculty and students. The program offers experimental emphasis and coursework in behavioral and developmental neuroscience, cognitive science, sensation and perception, and social/affective science. The program does not offer training in clinical or counseling psychology. The objective of the PhD program is to prepare students to become experts in research and teaching in psychology. To accomplish this goal, the department takes a mentoring approach whereby the graduate students are apprentices in faculty laboratories, working closely with their faculty mentors throughout their time in the program. The basic apprenticeship relationship is supplemented by other activities, such as required courses (concentrated in the first and second years), advanced seminars and/or course work in this as well as other departments or universities, a colloquium series, assignments as teaching assistants, the master's project, and the dissertation and its oral defense. After the first year, the structure of the doctoral program, including course work, is flexible and assumes that the process of learning and scientific discovery must be individualized. Graduate students also have an opportunity to develop their teaching and research skills through close mentoring of undergraduate research assistants. The PhD program is a five-year, twelve-months-per-year program.

The dissertation committee must include at least three tenured or tenure-track faculty members from within the psychology department—two from the student's interest area and one from another area. The oral defense committee consists of the dissertation committee plus additional tenured and tenure-track faculty members from the psychology department.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Psychology (<https://catalog.northeastern.edu/graduate/science/psychology/psychology-ms/>) degree. Note that no students will be admitted directly into the Psychology program to pursue a master's degree.

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

First-year paper
 Master's proposal
 Master's paper
 Master's presentation
 Annual review
 Dissertation committee
 Dissertation proposal
 Dissertation
 Dissertation defense
 At least two assigned courses as teaching assistant

Core Requirements

All graduate courses within the Department of Psychology are graded S/U. A grade of S is required in each psychology department course.

Code	Title	Hours
Fundamentals		
Complete the following:		
PSYC 5110	Cognitive Science	3
PSYC 5170	Social and Affective Science	3
Complete one of the following:		3
PSYC 5115	Colloquium	
PSYC 5120	Proseminar in Sensation	
PSYC 5130	Proseminar in Perception	
PSYC 5140	Proseminar in Biology of Behavior	
PSYC 5150	Proseminar in Clinical Neuroscience	
Research Dissemination		
PSYC 5301	Research Methods in Psychological Sciences	3
Quantitative Methods		
PSYC 5180	Quantitative Methods 1	3
PSYC 5181	Quantitative Methods 2	3
Ethics		
PSYC 7302	Ethics and Professional Issues	3
Project		
Take the following (repeatable) course three times:		9
PSYC 8401	Research Project	
Thesis		
Take the following (repeatable) course twice:		6
PSYC 7990	Thesis	

Electives

Code	Title	Hours
Complete 14 semester hours from the following:		14
Note: Proseminars not taken to fulfill core requirements and courses outside the department may be taken if approved by faculty adviser and Director of Graduate Studies.		
PSYC 7200 to PSYC 7300		
PSYC 5110	Cognitive Science	
PSYC 5115	Colloquium	
PSYC 5120	Proseminar in Sensation	
PSYC 5130	Proseminar in Perception	
PSYC 5140	Proseminar in Biology of Behavior	
PSYC 5150	Proseminar in Clinical Neuroscience	
PSYC 5170	Social and Affective Science	
PSYC 8402	Special Topics in Psychology	

Dissertation

Code	Title	Hours
PSYC 9990	Dissertation Term 1	
PSYC 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
PSYC 9996	Dissertation Continuation	

Program Credit/GPA Requirements

50 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
Complete the following:		Complete the following:		PSYC 8401	3
PSYC 5110		3 PSYC 5170		3 Elective	3
PSYC 5180		3 PSYC 5181		3 Elective	2-3
PSYC 8401		3 PSYC 8401		3	
		Complete one of the following:		3	
		PSYC 5120			
		PSYC 5130			
		PSYC 5140			
		PSYC 5150			
		PSYC 5115			
		9		12	8-9
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
Elective		3 Elective		3 PSYC 7302	3
Complete the following:		Complete the following:		PSYC 7996	0
PSYC 7990		3 PSYC 7990		3 Elective	3
PSYC 5301		3			
		9		6	6
Year 3					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 9990		0 PSYC 9991		0 PSYC 9996	0
		0		0	0
Year 4					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 9996		0 PSYC 9996		0 PSYC 9996	0
		0		0	0
Year 5					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 9996		0 PSYC 9996		0 PSYC 9996	0
		0		0	0

Total Hours: 50-51

Advanced Entry Program Requirements

The PhD program in the Department of Psychology covers a wide spectrum of contemporary behavioral science within a close-knit community of faculty and students. Advanced Entry is for students who enter possessing a master's degree in psychology or another acceptable field. The program offers four overlapping areas of experimental emphasis: behavioral neuroscience, cognition, perception, and social/personality. The program does not offer training in clinical or counseling psychology. The objective of the PhD program is to prepare students to become experts in research and teaching in psychology. To accomplish this goal, the department takes a mentoring approach whereby the graduate students are apprentices in faculty laboratories, working closely with their faculty mentors throughout their time in the program. The basic apprenticeship relationship is supplemented by other activities, such as required courses (concentrated in the first and second years), advanced seminars and/or course work in this as well as other departments or universities, a colloquium series, assignments as teaching assistants, the master's project, and the dissertation and its oral defense. After the first year, the structure of the doctoral program, including course work, is flexible and assumes that the process of learning and scientific discovery must be individualized. Graduate students also have an opportunity to develop their teaching and research skills through close mentoring of undergraduate research assistants. The PhD program is a five-year, 12-months-per-year program.

For students who enter the program with a suitable master's degree, degree candidacy is established through completion of a set of requirements determined on an individual basis. An additional 20 semester hours beyond the master's degree are required for the PhD degree. The dissertation committee must include at least three tenured or tenure-track faculty members from within the psychology department—two from the student's interest area and one from another area. The oral defense committee consists of the dissertation committee plus additional tenured and tenure-track faculty members from the psychology department.

Complete all courses and requirements listed below unless otherwise indicated. Individual programs of study will be tailored to acknowledge students' previous coursework.

Milestones

Master's presentation
 Annual review
 Dissertation committee
 Dissertation proposal
 Dissertation
 Dissertation defense
 At least two assigned courses as teaching assistant

Core Requirements

A grade of S is required in each psychology department course.

Code	Title	Hours
Consult your faculty adviser and director of graduate studies for acceptable coursework.		10

Electives

Code	Title	Hours
Consult your faculty adviser and graduate director for acceptable electives.		10

Dissertation

Code	Title	Hours
PSYC 9990	Dissertation Term 1	
PSYC 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
PSYC 9996	Dissertation Continuation	

Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

Note: The number of semester hours to complete this program may be more than 20. The number of semester hours and the specific required courses will be determined by a review of previous coursework by the graduate director and faculty adviser.

Cross-Disciplinary Science PhD

The Cross-Disciplinary Science PhD provides a framework for housing a series of combined PhD programs representing research evolution into cutting-edge areas that cross disciplinary boundaries driven by the demands of current world challenges. The rapid pace of research in these areas requires efficient development of new combined PhD programs, which draw on expertise from different disciplines, and can be developed efficiently under the common framework of the Cross-Disciplinary Science PhD. This framework provides the flexibility for PhD programs that reflect the multidisciplinary nature of the research performed by faculty and students interested in solving challenging problems through cross-disciplinary approaches.

Programs

- Biophysics (Boston) (p. 1219)
- Human Behavior and Sustainability Sciences (Boston) (p. 1169)

Interdisciplinary Programs

Programs

Doctor of Philosophy

- Network Science (Boston) (p. 241)

Master of Science

- Applied Physics and Engineering (Boston) (p. 557)
- Climate Science and Engineering (Boston) (p. 520)
- Complex Network Analysis (Boston) (p. 166)
- Environmental Science and Policy (Boston) (p. 1174)

- Statistics, MS (Boston) (p. 187)
- Statistics, MS—Connect (Boston) (p. 189)

Biophysics, PhD (Boston)

The Biophysics PhD program at Northeastern University is a combined and cross-disciplinary program that draws expertise from the physics, biology, and chemistry departments. Designed to meet the growing need for interdisciplinary research, this program focuses on the application of physical and chemical principles to understand complex biological systems. Through this unique partnership, students explore biological phenomena at all scales, from molecules to entire organisms, using quantitative and experimental methods.

This program offers a comprehensive curriculum that includes core courses in statistical mechanics, chemistry, and cell and molecular biology, along with a recurring graduate biophysics seminar. Emphasizing both theoretical knowledge and practical experience, the program covers techniques such as spectroscopy, computational modeling, and advanced microscopy, while also promoting the development of essential skills in data science and machine learning. This approach is designed to enable students to address significant scientific challenges in fields such as biotechnology and health sciences.

Structured under the College of Science's cross-disciplinary science PhD umbrella, the program allows for flexibility based on each student's background and career goals. Students engage in research rotations and are encouraged to seek external internships to broaden their professional experience and network. The program's structure supports students as they build a solid foundation in biophysics, preparing them for candidacy exams and offering pathways into diverse scientific careers.

Successful graduates of the Biophysics PhD program are equipped to excel in academia, industry, and beyond. By fostering a collaborative research environment that draws on the strengths of multiple disciplines, this program aims to produce scientists capable of groundbreaking research with a lasting impact on both science and society.

Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Cross-Disciplinary Science (<https://catalog.northeastern.edu/graduate/science/interdisciplinary/cross-disciplinary-science-ms-bos/>) degree. Note that no students will be admitted directly into the Cross-Disciplinary Science program to pursue a master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
 Lab rotations
 Identify PhD advisor
 Dissertation committee
 Dissertation proposal and presentation
 Candidacy
 Dissertation/dissertation defense

Core Requirements

Code	Title	Hours
Thermodynamics and Statistical Mechanics		
CHEM 5636 or PHYS 7305	Statistical Thermodynamics Statistical Physics	3
Chemistry		
CHEM 5621 or CHEM 5638 or CHEM 5641	Principles of Chemical Biology Molecular Modeling Computational Chemistry	3
Cell and Molecular Biology		
BIOL 6301	Molecular Cell Biology	4
Biological Physics		
PHYS 7731	Physics of Biological Processes and Living Systems 1	4
Graduate Biophysics Seminar		
Complete this repeatable course each semester of the program:		0
INSC 7100	Biophysics Seminar	
Laboratory Rotation		

Complete the following variable credit course twice (register at 3 semester hours for the first lab rotation and at 2 semester hours for the second lab rotation):

PHYS 9984	Advanced Research

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12

Physics Breadth Courses

PHYS 5116	Network Science 1
PHYS 5318	Principles of Experimental Physics
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7302	Electromagnetic Theory
PHYS 7315	Quantum Theory 1
PHYS 7321	Computational Physics
PHYS 7322	Nonequilibrium Physics
PHYS 7335	Dynamical Processes in Complex Networks
PHYS 7741	Physics of Biological Processes and Living Systems 2

Biology Breadth Courses

BIOL 5103 to BIOL 6961

Chemistry Breadth Courses

CHEM 5610 to CHEM 5688

Dissertation

Code	Title	Hours
After achieving candidacy, students complete Dissertation Term 1 in the department of their PhD advisor. In the following semester, they complete Dissertation Term 2.		

PHYS 9990	Dissertation Term 1
or CHEM 9990	Dissertation Term 1
or BIOL 9990	Dissertation Term 1
PHYS 9991	Dissertation Term 2
or CHEM 9991	Dissertation Term 2
or BIOL 9991	Dissertation Term 2

Complete the following (repeatable) course until graduation:

PHYS 9996	Dissertation Continuation
or CHEM 9996	Dissertation Continuation
or BIOL 9996	Dissertation Continuation

Program Credit/GPA Requirements

31 total semester hours required

Minimum 3.000 GPA required

Network Science, PhD (Boston)

The PhD in Network Science program aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is a multidisciplinary program, with members of the Northeastern University Network Science Institute (<https://www.networkscienceinstitute.org/>) representing a range of fields including computer science, information science, physics, complexity, sociology, communication, data visualization, organizational behavior, political science, population health, and epidemiology.

This doctoral program is a joint collaboration across five academic colleges. Students are admitted to the College of Social Sciences and Humanities and may choose to move to the home college of their dissertation advisor after they reach candidacy (once they pass their dissertation proposal/comprehensive exam). Students follow policies of their home college, including dissertation format and submission deadlines for graduation. Faculty supervisors may be from one of the following Northeastern academic colleges:

- College of Science
- College of Social Sciences and Humanities
- Khoury College of Computer Sciences

- Bouvé College of Health Sciences
- College of Arts, Media and Design

Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of elective courses relevant to the student's area of research. Electives should be discussed with the student's faculty advisor. A minimum of 40 semester hours of coursework is required, though the faculty advisor or program committee may recommend additional coursework based on student research skills.

Alternative Course Path

Students have the option to complete core coursework in their first year of study. This curriculum pathway is expected to be taken by students whose admitting advisor is located outside of the Boston campus and elsewhere in the Northeastern network.

Annual Review

A review of satisfactory progress will be ongoing and formally evaluated at the end of each academic year. Students must maintain a cumulative grade-point average of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain a 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for dismissal by the graduate program committee.

As part of the annual review process, the students will be asked to submit a summary of completed and future courses and research. Students will submit to the program committee:

- A list of courses completed in the last academic year and course plan for the following year
- A short synopsis of their research progress and research plans for the next year

Qualifying Examination

The qualifying exam is an hour-long oral examination of the material covered in the core curriculum and consists of questions selected by network science faculty. One month prior to the exam., students receive between 50 to 80 study questions to prepare. Students will be asked to give a short presentation of their research plans, followed by an oral exam where the qualifying exam panel will ask a subset of the review questions.

Students must take the exam by the fall semester of their third year. If students fail the qualifying exam on their first attempt, they may retake the exam in the following semester. Students who do not pass the exam after two attempts will be asked to leave the program.¹

Dissertation Committee

Students must confirm their dissertation advisor by the end of their second year. The dissertation advisor must be a full-time, tenured, tenure-track, research, or teaching faculty member of Northeastern. The advisor should be a network science doctoral program faculty member, unless the student receives approval by the network science program committee.

Students must confirm their dissertation committee prior to their comprehensive exam. The committee must consist of a minimum of four members:

1. A dissertation advisor
2. A core member of the Network Science Institute faculty
3. An additional tenured/tenure-track, research, or teaching faculty member from the Network Science Institute or other Northeastern faculty approved by the advisor and program committee
4. One member recognized as an expert in the specific topic of research, who can be external to Northeastern.

Dissertation Proposal (Comprehensive Examination)

The comprehensive exam should be completed in the student's fourth year of study. The exam consists of two parts: preparation of the dissertation proposal and oral presentation of the proposal. Students must prepare a written comprehensive research proposal describing the dissertation research plan including review of relevant literature, research questions, motivation, methods, any preliminary results, and potential impact. The proposal must be shared with the doctoral committee members two weeks prior to the scheduled presentation.

Students will give a 30-minute oral presentation to their committee members that is open to the public. Following the presentation, the dissertation committee will assess the proposed research plan and provide feedback to the student. If the proposal and/or presentation do not meet the expectations of the committee, the student will be asked to revise their proposal and/or their presentation. The completion of the comprehensive exam is considered successful if the dissertation committee approves as satisfactory both the written proposal and the oral presentation. Students may repeat the comprehensive exam once. If they are unsuccessful in their second attempt, the program will ask the student to leave the program.

PhD Candidacy

A student is considered a doctoral candidate upon completion of the required coursework with a minimum cumulative GPA of 3.000, a passing score on the qualification exam, and satisfactory completion of the comprehensive exam.

Dissertation

A PhD student should aim to complete their dissertation in their fifth year of study. Upon successful completion of the research plan proposed in the dissertation proposal, the candidate has an opportunity to prepare the dissertation for approval by the dissertation committee. The dissertation must contain results of extensive research and make an original contribution to the field. The work should give evidence of the candidate's ability to carry

out independent research. It is expected that the dissertation consists of one or more research studies of sufficient quality to merit publication in a reputable journal(s).

Dissertation Defense

Like the dissertation proposal, the dissertation defense consists of two parts: the written dissertation and the defense oral presentation. The PhD candidate should send the written dissertation to their dissertation committee at least one month prior to the dissertation defense.

The oral dissertation defense will be open to the public and will include a Q&A session. Following the presentation, the dissertation committee will communicate their assessment of whether they consider the candidate's dissertation requirement fulfilled. Once the dissertation requirement is fulfilled, the PhD candidate is ready to graduate. Students then apply to graduate and follow the formatting guidelines and deadlines of their home college.

¹Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MS in Network Science degree. Note that no students will be admitted directly into the MS in Network Science to pursue a master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Coursework
Annual reviews
Qualifying exam
Dissertation committee
Dissertation proposal (comprehensive examination)
Dissertation
Dissertation defense

Core Requirements

Code	Title	Hours
Students must complete all 20 semester hours of the core courses listed below, unless the program director approves changes to the student's course plan:		
NETS 5116	Network Science 1	4
NETS 6116	Network Science 2	4
NETS 7332	Machine Learning with Graphs	4
NETS 7334	Social Networks	4
NETS 7335	Dynamical Processes in Complex Networks	4

Electives

Code	Title	Hours
Complete 20 semester hours from the following elective course options.		20
The student's elective course plan should be discussed with, and approved by, their advisor. Students who seek to apply courses not on this list to fulfill program requirements must obtain written approval from their advisor and the program director. Elective options below are organized by domain areas. Students may take courses from one or more domain areas.		

Computational Social Science

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5314	Complexity in Social Systems
CNET 5411	Financial and Economic Networks
CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
NETS 7341	Network Economics
NETS 7350	Bayesian and Network Statistics
NETS 7360	Research Design for Social Networks
NETS 7370	Computational Urban Science
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHYS 7332	Network Science Data 2

Computer Science

CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6220	Data Mining Techniques
CS 7180	Special Topics in Artificial Intelligence
CS 7260	Visualization for Network Science
CS 7295	Special Topics in Data Visualization
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHYS 7332	Network Science Data 2

Epidemiology and Public Health

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5515	Complex Network Analysis for Biological Systems
CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
NETS 7370	Computational Urban Science
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6202	Intermediate Epidemiology
PHTH 6400	Principles of Population Health 1
PHTH 6410	Principles of Population Health 2
PHTH 6800	Causal Inference in Public Health Research
PHYS 7332	Network Science Data 2

Mathematic and Physics

CNET 5901	Visualizing Complex Networks
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CS 5800	Algorithms
MATH 7233	Graph Theory
MATH 7243	Machine Learning and Statistical Learning Theory 1
NETS 7976	Directed Study
NETS 8941	Network Science Literature Review Seminar
PHYS 5211	Introduction to Scientific Computing
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
PHYS 7332	Network Science Data 2

Dissertation

Code	Title	Hours

Precandidacy

Students should register for NETS 8986 after passing the qualifying exam and before completing the comprehensive exam (proposal defense):

NETS 8986	Research

Dissertation

After passing the comprehensive exam (reaching candidacy), students should register for NETS 9990 and NETS 9991, successively:

NETS 9990	Dissertation Term 1

NETS 9991

Dissertation Term 2

Dissertation Continuation

After completing both NETS 9990 and NETS 9991, students should register for NETS 9996 each semester until graduation:

NETS 9996

Dissertation Continuation

Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

Plan of Study**Typical Plan of Study**

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
Elective course		4 NETS 7334	4
Elective course		4 One elective course	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
NETS 7332		4 NETS 7335	4
One elective course		4 One elective course	4
		8	8
Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0
Total Hours: 40			

Alternate Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
NETS 7332		4 NETS 7334	4
One elective course		4 NETS 7335	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
Elective		4 Elective	4
Elective		4 Elective	4
		8	8
Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0

Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0
Total Hours: 40			

Applied Physics and Engineering, MS (Boston)

The combined MS program in applied physics and engineering allows graduate students to receive training in one of three concentrations of the electrical and computer engineering department while also receiving fundamental graduate-level physics training that is relevant to that area.

Thesis Option

Students may register for an additional two semesters of thesis work. Depending on the affiliation of the thesis advisor, students may register for Thesis (PHYS 7990) for a total of 8 semester hours or 4 semester hours of Master's Project (EECE 7945) followed by 4 semester hours of Thesis (EECE 7990). Thesis credits cannot be substituted for any of the coursework listed above. This option requires a total of 40 semester hours for the master's degree. A thesis committee is composed of an advisor and two faculty members from physics or electrical engineering.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Concentrations

Complete one of the following concentrations:

- Analysis, Modeling, and Computation (p. 558)
- Electromagnetics, Plasma, and Optics (p. 558)
- Microsystems, Materials, and Devices (p. 559)

Optional Thesis

Code	Title	Hours
Select one of the following options based on the college affiliation of the thesis advisor. Thesis coursework will not be applied to other requirements of this degree program. Completion of this thesis option requires a total of 40 semester hours to earn the degree:		8

Option 1 (College of Science thesis advisor)

PHYS 7990	Thesis (completed twice over two semesters)

Option 2 (College of Engineering thesis advisor)

EECE 7945	Master's Project
EECE 7990	Thesis

Program Credit/GPA Requirements

32 total semester hours required (40 with optional thesis)

Minimum 3.000 GPA required

ANALYSIS, MODELING, AND COMPUTATION

Code	Title	Hours
Core Courses		
EECE 7205	Fundamentals of Computer Engineering	4
PHYS 7321	Computational Physics	4
Engineering Coursework		
Complete 12 semester hours from the following:		12
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	

EECE 5643	Simulation and Performance Evaluation
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7205	Fundamentals of Computer Engineering
EECE 7271	Computational Methods in Electromagnetics
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7374	Fundamentals of Computer Networks

Physics Coursework

Complete 12 semester hours from the following: 12

PHYS 5116	Network Science 1
PHYS 5318	Principles of Experimental Physics
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7305	Statistical Physics
PHYS 7335	Dynamical Processes in Complex Networks

ELECTROMAGNETICS, PLASMA, AND OPTICS

Code	Title	Hours

Core Courses

EECE 7203	Complex Variable Theory and Differential Equations	4
PHYS 7302	Electromagnetic Theory	4

Engineering Coursework

Complete 12 semester hours from the following: 12

EECE 5698	Special Topics in Electrical and Computer Engineering (Subsurface Imaging)
EECE 7105	Optics for Engineers
EECE 7202	Electromagnetic Theory 1
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7293	Modern Imaging

Physics Coursework

Complete 12 semester hours from the following: 12

PHYS 5318	Principles of Experimental Physics
PHYS 7305	Statistical Physics
PHYS 7315	Quantum Theory 1
PHYS 7316	Quantum Theory 2
PHYS 7321	Computational Physics
PHYS 7324	Condensed Matter Physics
PHYS 7731	Physics of Biological Processes and Living Systems 1

MICROSYSTEMS, MATERIALS, AND DEVICES

Code	Title	Hours

Core Courses

EECE 7201	Solid State Devices	4
PHYS 7324	Condensed Matter Physics	4

Engineering Coursework

Complete 12 semester hours from the following: 12

EECE 5606	Micro- and Nanofabrication
EECE 5680	Electric Drives
EECE 7204	Applied Probability and Stochastic Processes
EECE 7240	Analog Integrated Circuit Design
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7353	VLSI Design
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering

Physics Coursework

Complete 12 semester hours from the following:

12

PHYS 5318	Principles of Experimental Physics
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7302	Electromagnetic Theory
PHYS 7305	Statistical Physics
PHYS 7315	Quantum Theory 1
PHYS 7316	Quantum Theory 2
PHYS 7321	Computational Physics
PHYS 7734	Topics: Condensed Matter Physics

Climate Science and Engineering, MS (Boston)**Overview**

The Master of Science in Climate Science and Engineering is offered jointly by the College of Engineering and the College of Science. The program provides training in the fundamental scientific processes that underpin the structure and dynamics of the climate, as well as the engineering strategies and technologies required for decarbonization and adaptation to climate change.

Incoming students will typically hold a bachelor's degree in a science, engineering, or related field. The program is designed to prepare students for climate-facing positions in the public or private sectors and can serve as a springboard for students interested in pursuing doctoral-level research. Students must take at least 12 semester hours of College of Science courses and at least 12 semester hours of College of Engineering courses, which includes a report, thesis, or coursework option.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Student should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP**Master's Degree in Climate Science and Engineering with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Climate Science and Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved technical courses. For students who concurrently enroll in the Graduate Certificate in Engineering Leadership (p. 738), 12 semester hours of the certificate coursework may be applied to the restricted elective requirements of this program's coursework option. Of the remaining 20 semester hours required by this program, students must take 12 semester hours of College of Science courses (subject codes EEMB and ENVR) and 8 semester hours from College of Engineering courses (subject codes CIVE, EECE, ENSY, MATL, ME, and SBSY).

The Department of Civil and Environmental Engineering encourages students pursuing the Graduate Certificate in Engineering Leadership (p. 738) to complete their MS coursework requirements in their first year and their certificate requirements in their second year. Students who prefer to complete their certificate requirements in their first year are asked to speak with their MS degree advisor in advance.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated. In order to ensure a balance of training across science and engineering, students must take at least 12 semester hours of College of Science courses (starting with EEMB, ENVR) and at least 12 semester hours of College of Engineering courses (starting with CIVE, EECE, ENSY, MATL, ME, SBSY) from the core requirements and restricted elective course options.

Core Requirements

Code	Title	Hours
Complete 20 semester hours from the core requirements listed below (any core course not used to meet this core course requirement can be taken as a restricted elective):		
CIVE 5150	Climate and Atmospheric Change	20

or ENVR 5150	Climate and Atmospheric Change
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure
CIVE 5281	Coastal Dynamics and Design
CIVE 5363	Climate Science, Engineering Adaptation, and Policy
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation
CIVE 5366	Air Quality Engineering and Science
CIVE 5670	Global Biogeochemistry
or ENVR 5670	Global Biogeochemistry
CIVE 7110	Critical Infrastructure Resilience
ENVR 5350	Sustainable Energy and Climate Solutions
ENVR 5600	Coastal Processes, Adaptation, and Resilience
ENVR 5800	Climate Adaptation and Nature-Based Solutions

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the restricted electives course list below. (p. 522)		12

REPORT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
or EEMB 8984	Research	
Complete 8 semester hours from the restricted electives course list below. (p. 522)		8

THESIS OPTION

Code	Title	Hours
Complete CIVE 7945 and CIVE 7990 for 8 semester hours or complete EEMB 8984 twice for 8 semester hours:		8
CIVE 7945 and CIVE 7990	Master's Project and Thesis	
EEMB 8984	Research (Completed twice)	
Complete 4 semester hours from the restricted electives course list below. (p. 522)		4

In addition to completing the thesis course, College of Engineering students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Restricted Electives

Code	Title	Hours
CIVE 5280	Remote Sensing of the Environment	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7282	Coastal and Hydraulic Modeling	
CIVE 7385	Public Transportation	
CIVE 7392	Special Topics in Environmental Engineering	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ENVR 5210	Environmental Planning	
ENVR 5220	Ecosystem-Based Management	
ENVR 5563	Advanced Spatial Analysis	
INTL 5100	Climate and Development	
LAW 7634	Energy Law and Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	

MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting
ME 5685	Solar Thermal Engineering
PPUA 5238	Climate Change and Global Urbanization
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change
PPUA 5268	International Environmental Policy
SBSY 5100	Sustainable Design and Technologies in Construction
SBSY 5200	Sustainable Engineering Systems for Buildings

Optional Co-op Experience

Code	Title	Hours
Complete the following (students must complete ENCP 6100 to qualify for co-op experience):		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

Complex Network Analysis, MS (Boston)

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master's degree program in complex network analysis methodologies. The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business
4. Biological systems modeling used across research and industry including network biology, drug discovery, or multi-omics mining

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Biological Networks—College of Science
- Complex Social Systems—College of Social Sciences and Humanities
- Economic and Technological Networks—Khoury College of Computer Sciences
- Population Health Dynamics—Bouv  College of Health Sciences

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CNET 5050	Fundamentals of Complex Networks	4
CNET 5051	Analyzing Complex Network Data	4
CNET 5052	Advanced Tools for Complex Network Analysis	4

CNET 5901	Visualizing Complex Networks	2
CNET 5902	Communicating Network Data	2

Concentrations

Complete one of the following concentrations:

- Complex Biological Networks (p. 167)—College of Science
- Complex Social Systems (p. 168)—College of Social Sciences and Humanities
- Economic and Technological Networks (p. 168)—Khoury College of Computer Sciences
- Population Health Dynamics (p. 169)—Bouvé College of Health Sciences

Experiential Courses

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		4
CNET 6107	Complex Network Analysis Research Rotation	
CNET 6108	Complex Network Analysis Capstone	
CNET 6990	Thesis	

Optional Co-op

Code	Title	Hours
CNET 6000	Professional Development for Co-op	1
CNET 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

Minimum 33 total semester hours required

Additional hours may be required based on student choice of courses or concentration.

One semester hour of additional coursework is required for participation in co-op.

Minimum 3.000 GPA required

CONCENTRATION IN COMPLEX BIOLOGICAL NETWORKS—COLLEGE OF SCIENCE

Code	Title	Hours
A minimum of 16 semester hours is required to complete this concentration.		
Required		
CNET 5515	Complex Network Analysis for Biological Systems	4
Complete 8 semester hours from the following:		8
BINF 6308	Bioinformatics Computational Methods 1	
BINF 6310	Introduction to Bioinformatics	
EEMB 5130	Population Dynamics	
ENVR 5450	Applied Social-Ecological Systems Modeling	
MATH 5131	Introduction to Mathematical Methods and Modeling	
MATH 7340	Statistics for Bioinformatics	
PHYS 5211	Introduction to Scientific Computing	
Complete 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5314	Complexity in Social Systems	
CNET 5411	Financial and Economic Networks	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN COMPLEX SOCIAL SYSTEMS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
A minimum of 13 semester hours is required to complete this concentration.		
Required		

CNET 5314	Complexity in Social Systems	3
Complete a minimum of 6 semester hours from the following:		6
CNET 5311	Physical and Digital Human Traces	
CNET 5360	Research Design for Social Networks	
INSH 5301	Introduction to Computational Statistics	
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	
INSH 6300	Research Methods in the Social Sciences	
INSH 6304	Modeling and Analyzing Social Networks	
INSH 6406	Analyzing Complex Digitized Data	
INSH 6500	Statistical Analysis	
PHYS 5211	Introduction to Scientific Computing	
PPUA 5262	Big Data for Cities	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5411	Financial and Economic Networks	
CNET 5515	Complex Network Analysis for Biological Systems	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN ECONOMIC AND TECHNOLOGICAL NETWORKS—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
A minimum of 14 semester hours is required to complete this concentration.		
Required		
CNET 5411	Financial and Economic Networks	3
Complete a minimum of 7 semester hours from the following:		7
CS 7150	Deep Learning	
CS 7200	Statistical Methods for Computer Science	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
MISM 6212	Data Mining and Machine Learning for Business	
PHYS 5211	Introduction to Scientific Computing	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	
CNET 5314	Complexity in Social Systems	
CNET 5515	Complex Network Analysis for Biological Systems	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

CONCENTRATION IN POPULATION HEALTH DYNAMICS—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
A minimum of 14 semester hours is required to complete this concentration.		
Required		
CNET 5126	Spreading on Networks: From Epidemics to Memes	4
Complete a minimum of 6 semester hours from the following:		6
BINF 6308	Bioinformatics Computational Methods 1	
PHTH 5210	Biostatistics in Public Health	
PHTH 6210	Applied Regression Analysis	
PHTH 6224	Social Epidemiology	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6800	Causal Inference in Public Health Research	

PHTH 6801	Causal Inference 1	
PHYS 5211	Introduction to Scientific Computing	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5314	Complexity in Social Systems	
CNET 5411	Financial and Economic Networks	
CNET 5515	Complex Network Analysis for Biological Systems	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

Environmental Science and Policy, MS (Boston)

The Master of Science in Environmental Science and Policy program emphasizes a broadly interdisciplinary and synthetic approach that integrates knowledge in the environmental sciences (conservation biology, climate change, fisheries science, ecosystem function, biodiversity, restoration ecology) with the social sciences (policy, economics, sociology, political science, and development) and humanities (environmental history, philosophy, and ethics). The goal of the program is to equip professionals with substantive breadth in knowledge and skills at the intersection of environmental science and policy. The program focuses on training students to think critically about the underlying causes of environmental problems and understanding the reciprocal relationships between coupled human-natural ecosystems and the interconnections between social and technological innovations. The program explores practical approaches and potential solutions that decision makers need to evaluate in policy debates related to promoting environmental sustainability.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Seminars		
PPUA 6101	Environmental Science and Policy Seminar 1	4
ENVR 6102	Environmental Science and Policy Seminar 2	4
Skills Courses		
Complete 2 courses from the following. At least one course needs to be taken from the College of Science Skills Course List and one course from the College of Social Sciences and Humanities Skills Course List.		8
<i>College of Science Skills Course List</i>		
EEMB 5130	Population Dynamics	
EEMB 5522	Experimental Design Marine Ecology	
ENVR 5150	Climate and Atmospheric Change	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
ENVR 5450	Applied Social-Ecological Systems Modeling	
ENVR 6500	Biostatistics	
<i>College of Social Sciences and Humanities Skills Course List</i>		
INSH 5301	Introduction to Computational Statistics	
INSH 6300	Research Methods in the Social Sciences	
INSH 7400	Quantitative Analysis	
LPSC 7311	Strategizing Public Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6506	Techniques of Policy Analysis	

PPUA 6509

Techniques of Program Evaluation

PPUA 7237

Advanced Spatial Analysis of Urban Systems

Electives

Complete five courses from the following list. At least one course must be taken from the College of Science Elective Course List and one course from the College of Social Sciences and Humanities Elective Course List. Any skills course not taken to fulfill the skills courses requirement can be taken as an elective. Students may petition to enroll in other relevant graduate courses offered by other schools at Northeastern University.

COLLEGE OF SCIENCE ELECTIVE LIST

Code	Title	Hours
EEMB 5130 - EEMB 8984		
ENVR 5115 - ENVR 6900		

COLLEGE OF SOCIAL SCIENCES AND HUMANITIES ELECTIVE LIST

Code	Title	Hours
INSH 5302	Information Design and Visual Analytics	
INTL 5100	Climate and Development	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5100 - PPUA 7346		
SOCL 7267	Environment, Health, and Society	

Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

Statistics, MS (Boston)

The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The Master of Science in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouv  College of Health Sciences
- Statistical machine learning—Khoury College of Computer Sciences
- Statistical theory and modeling—College of Science

Students will follow all policies associated with their home college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800	Causal Inference in Public Health Research	3-4

or PHTH 6801	Causal Inference 1	
PHTH 6830	Generalized Linear Models	4

Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 188)—Bouv  College of Health Sciences
- Statistical Machine Learning (p. 188)—Khoury College of Computer Sciences
- Statistical Theory and Modeling (p. 188)—College of Science

Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses may be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

Program Credit/GPA Requirements

31 total semester hours required (32 for students who declare the Concentration in Statistical Theory and Modeling and also opt to participate in co-op)

Minimum 3.000 GPA required

CONCENTRATION IN BIOSTATISTICS (BOUV  COLLEGE OF HEALTH SCIENCES)

Code	Title	Hours
Complete 12 semester hours from the following:		12
PHTH 5350	Using SAS in Public Health Research	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	
Optional Co-op		
HLTH 6964	Co-op Work Experience	0

CONCENTRATION IN STATISTICAL MACHINE LEARNING (KHOURY COLLEGE OF COMPUTER SCIENCES)

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Essentials of Data Science	4
Optional Co-op		
CS 6964	Co-op Work Experience	0

CONCENTRATION IN STATISTICAL THEORY AND MODELING (COLLEGE OF SCIENCE)

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
Optional Co-op		
EESC 6500	Pathways to Professional Success	1
EESC 6964	Co-op Work Experience	0

Statistics, MS—Connect (Boston)

The Master of Science in Statistics—Connect program is designed for students from all backgrounds with a BS/BA degree, provided the student has experience with basic calculus and statistics. The first semester of the degree program provides students with the foundational knowledge needed to study successfully alongside direct-entry graduate students. The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The MS in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouv  College of Health Sciences
- Statistical Machine Learning—Khoury College of Computer Sciences
- Statistical Theory and Modeling—College of Science

Students will follow all policies associated with their college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Connect Courses

Code	Title	Hours
Students are required to complete 8–10 semester hours from the following unless otherwise determined by the program:		8-10
CS 5001	Intensive Foundations of Computer Science	
MATH 5001	Accelerated Linear Algebra	
MATH 5002	Accelerated Multivariable Calculus	
MATH 5003	Accelerated Probability and Statistics	
MATH 5110	Applied Linear Algebra and Matrix Analysis	

Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

Concentrations

Complete one of the following concentrations:

- Biostatistics—Bouv  College of Health Sciences (p. 190)
- Statistical Machine Learning—Khoury College of Computer Sciences (p. 190)
- Statistical Theory and Modeling—College of Science (p. 190)

Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses can be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

Program Credit/GPA Requirements

39-41 total semester hours required (40-42 for students who declare the Concentration in Statistical Theory and Modeling and also opt to participate in co-op)

Minimum 3.000 GPA required

BIostatistics Concentration—Bouvé College of Health Sciences

Code	Title	Hours
Complete 12 semester hours from the following:		12
PHTH 5350	Using SAS in Public Health Research	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	
Optional Co-op		
HLTH 6964	Co-op Work Experience	0

Statistical Machine Learning Concentration—Khoury College of Computer Sciences

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Essentials of Data Science	4
Optional Co-op		
CS 6964	Co-op Work Experience	0

Statistical Theory and Modeling Concentration—College of Science

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
Optional Co-op		
EESC 6500	Pathways to Professional Success	1
EESC 6964	Co-op Work Experience	0

Graduate Certificate Programs

The College of Science is pleased to offer several graduate certificate programs for working professionals as well as postbaccalaureate students who want to build their knowledge in growing fields. Graduate certificates are offered in biotechnology, bioinformatics, applied mathematics, nanomedicine, and sustainability sciences. These programs are ideal for people already in the field who want to enhance their career or people who are looking to make a change.

Programs

Biology

- Bioinformatics (p. 1136) (Boston)
- Bioinformatics (p. 1138) (Portland)
- Omics (p. 1139) (Boston)

Chemistry and Chemical Biology

- Biodefense and Biosecurity (p. 1159) (Boston)
- Biopharmaceutical Analytical Sciences (p. 1160) (Boston)
- Biotechnology (p. 1160) (Boston)
- Biotechnology (p. 1160) (Portland)

- Biotechnology Enterprise (p. 1161) (Boston)
- Biotechnology Regulatory Science (p. 1161) (Boston)
- Experimental Biotechnology (p. 1162) (Boston)
- Manufacturing and Quality Operations in Biotechnology (p. 1162) (Boston)
- Molecular Biotechnology (p. 1162) (Boston)
- Molecular Biotechnology (p. 1163) (Portland)
- Pharmaceutical Technologies (p. 1163) (Boston)
- Process Science (p. 1164) (Boston)
- Vaccine Development (p. 1164) (Boston)

Marine and Environmental Sciences

- Sustainability Sciences (p. 1176) (Boston)

Mathematics

- Applied Mathematics (p. 1192) (Boston)

Physics

- Nanomedicine (p. 1211) (Boston)

College of Social Sciences and Humanities

Website (<https://cssh.northeastern.edu/>)

Kellee Tsai, PhD, Dean

Jun Ma, PhD, Associate Dean, Graduate Studies

CSSH Graduate Office

180 Renaissance Park

617.373.5990

gradcssh@northeastern.edu

CSSH Graduate Programs General Regulations (p. 1239)

Our Mission

The departments and programs of the College of Social Sciences and Humanities—with disciplines ranging from economics and history to English and international affairs, just to name a few—form an interdisciplinary collaborative of scholars with global perspectives. The CSSH mission is:

- To contribute to the experiential liberal arts education of all Northeastern University students
- To produce cutting-edge knowledge about and solutions to the political and social problems of our contemporary world
- To foster ethical reasoning and critical thought, with attention to the enduring significance of history, literature, and culture

This mission, along with a strong international focus, gives CSSH a central role in fulfilling Northeastern's ambition of educating global citizens.

CSSH Graduate Programs

Graduate education at Northeastern integrates the highest level of scholarship across disciplinary boundaries with significant research and experiential learning opportunities. This multidimensional learning environment offers students an opportunity to develop critical-thinking and creative problem-solving skills while introducing them to new perspectives in their fields. CSSH supports 16 master's programs, 8 doctoral programs, and 12 graduate certificate programs. Some courses and degree programs are offered in an online or hybrid format that provides additional flexibility for learners. Graduate programs in CSSH provide fertile ground and resources for advanced study and research. CSSH faculty members' cutting-edge interdisciplinary work inspires the development of new programs, research fellowship opportunities, and mentoring relationships.

All CSSH master's programs offer an optional cooperative education experience to eligible students. Cooperative education is central to both the Northeastern experience and to the CSSH experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with up to six months of work experiences in businesses, nonprofits, and government agencies in Boston, across the United States, and around the world. Through the co-op experience and integrative cocurricular coursework, graduate students apply what they have learned across contexts, bringing knowledge and skills gained in community learning spaces back to our campus learning spaces.

Our doctoral, master's, and professional degree programs produce graduates who are well prepared for the diverse demands of careers in academia, industry, and the professions. Please visit the College of Social Sciences and Humanities (<https://cssh.northeastern.edu/>) website for additional information, including latest news and upcoming events.

General Regulations

- Academic Appeals Procedures (p. 1239)
- Doctor of Philosophy (p. 1241)
- General Information (p. 1243)
- Master's Degrees (p. 1244)
- Regulations for All Students (p. 1244)

Academic Appeals Procedures

Northeastern University affirms that it is essential to provide an appeals mechanism to students who believe that they have been erroneously, capriciously, or otherwise unfairly treated. Information about the university appeals process and procedures can be found in this catalog (p. 133).

If a student feels that they have been the victim of harassment or of discrimination prohibited by law or by university policy, and that this constitutes a substantive basis for the appeal, they should consult with the Office for University Equity and Compliance (<https://ouec.northeastern.edu/>) as soon as they become aware of alleged prohibited harassment or discrimination, and they are not required to wait until a term grade or determination is received before seeking advice or redress. If the OUEC is advised of such alleged prohibited conduct as part of an academic appeal, the appeal shall first be pursued and investigated through the OUEC. Following a resolution of the harassment/discrimination issues, any remaining academic issues will be addressed, at the request of the student, according to the academic appeals procedures.

In cases that do not involve sexual harassment or discrimination, students may speak informally to their instructors or academic advisors about any determination or grade about which they have questions. If students choose to pursue an appeal, the College of Social Sciences and Humanities process is described in the appeals section that follows. The Graduate Academic Advisory Committee, which is comprised of an elected body of full-time CSSH faculty, serves as the Academic Appeals Committee for the CSSH.

Graduate Academic Advisory Committee

The GAAC shall be responsible for ensuring that the graduate curriculum of the college promotes the college's and university's evolving intellectual and pedagogical aims. The GAAC acts on all matters relating to the academic life of graduate students in the college in accordance with guidelines approved by the college and the GAAC. The responsibilities of the GAAC are:

- a. Oversight over the quality and scope of the college's graduate curricula, including recommendations for changes to the general program of the college, approval of graduate degree and certificate programs, and review of proposed changes to those programs.
- b. Review of student appeals on decisions concerning grades, academic dismissals, academic probation, change in requirements, permission to resume studies, academic warning, and repeating of courses. The GAAC shall adhere to all policies and procedures adopted by the faculty of the college and the Faculty Senate.

In addition, the GAAC shall adhere to policies and procedures issued by the Office of the Provost. Actions on graduate matters taken by the GAAC shall constitute the recommendations by the faculty on these matters. The GAAC shall make recommendations on behalf of the faculty directly to the dean (or the dean's designee). If the dean supports them, the recommendations shall, as needed, then be sent to the University Graduate Curriculum Committee for consideration. The GAAC's and dean's actions shall be reported periodically to the units involved and to the college council for informational purposes.

The GAAC is charged with review of student appeals on decisions concerning grades, academic probation, change in requirements, permission to resume studies, academic warning, and repeating of courses. Members of the GAAC from the student's own unit are recused from the appeal process. Graduate students may request permission to present their appeals in person. If a student believes that all pertinent information has not been presented, the student may request that the GAAC reconsider its decision. If the GAAC reaffirms its action, and the student is still not satisfied, an appeal for review may be made through the university's Academic Appeals Resolution Committee. The appeals procedure is described in this catalog (p. 133).

Grade Appeals

If a graduate student wishes to dispute a grade in a course taught by a member of the CSSH faculty, the first step is for the student to discuss their concerns with the faculty member who taught the course to see if it is possible to reach agreement on the issue(s). If the student is not able to resolve the issues with the faculty member who taught the course, the student should work with the department/program director to attempt a department-level resolution.

If these informal attempts to resolve the issue fail, the student can enter the formal procedure at the college level.

The student should meet with the associate dean for graduate studies who will attempt to resolve the issue by working with the instructor and the department/program. Contact the Graduate Office at gradcssh@northeastern.edu to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine whether or not there is just cause to convene the GAAC. In the

event of an alleged violation of the Student Code of Conduct, the associate dean will first seek a determination of the violation from the Office of Student Conduct and Conflict Resolution (<https://osccr.sites.northeastern.edu/>).

The decision to convene the GAAC will be based upon the following:

- The student attempted to resolve the complaint with the professor and the department/program.
- The complaint is substantive in nature (adjudication could affect a student's course grade and/or academic record).
- The complaint has been brought forward in a timely manner.
 - The statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student.
 - If a student wishes to dispute a grade in their final term, this must be done within 28 calendar days of the degree conferral date.

FORMAL COMPLAINT

If the associate dean determines the appeal should be brought to the GAAC, the student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean.

- The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint.
 - It is the student's responsibility to make their case. Students may submit any evidence such as emails, quizzes, examinations, etc.
- Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the faculty member and to the department/program director and convene a meeting of the GAAC.
- If the student fails to provide a well-reasoned written summary of the case, then the matter will be considered closed at the college level.
- The associate dean will make a good faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of their statement.

APPEALS MEETING

- The GAAC serves as the Academic Appeals Committee for the CSSH.
- The GAAC is convened in order to determine whether a fair and due process was used to determine the student's grade.
- The role of the committee is to conduct a review when a grade appeal is filed by a student regarding one of the following reasons:
 - Concern that the course grading policy was not applied consistently to all students within a class and/or section.
 - Concern that the instructor's method of assigning grades differed from the method outlined in the instructor's course syllabus.
 - Concern that the instructor failed to provide a clear policy on how grades would be assigned.

The student and the faculty member have the right to attend and present their case orally to the GAAC. The faculty member and the student aren't required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the GAAC may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. The complainant and the faculty member both have the right to testify privately and separately before the committee. Lawyers are not permitted in these proceedings. Generally, the faculty member and complainant are each given a 15-minute period to present their case.

The student usually presents their complaint to the committee first. This is followed by a brief Q&A of the student by the GAAC. The GAAC may ask the complainant any questions they have based upon either the written statement submitted by the complainant or the complainant's oral presentation. The faculty member then presents their case, which is followed by a brief Q&A of the faculty member. After both the complainant and faculty member have addressed the GAAC, the GAAC then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the GAAC believes it cannot resolve any issues without additional information, the GAAC may request any information needed from either the complainant, faculty member, or department/program. This information must be provided to the GAAC within one week of the meeting. If the requested information is not provided in the required time frame, then the GAAC may weigh this failure in making its final determination regarding the original complaint.

COMMITTEE PROCESS

- All decisions of the GAAC will be made based on a simple majority (51%) vote.
- Members of the GAAC from the student's own unit are recused from the appeal process.
- The associate dean is chair of the GAAC and only votes when there is a tie.
- The student bringing the complaint to the GAAC carries the burden of proof based on the weight of the evidence in demonstrating that the grade is incorrect or unjustified.
- If the GAAC decides that the grading process was unfair, the GAAC can request that the instructor changes the student's grade.
 - If an acceptable agreement involves a change of grade, the instructor is responsible for submitting a change of grade to the Office of the University Registrar in a timely manner following notification of the GAAC's decision.
- The student shall be notified within three business days of a decision being reached.

If the student is not satisfied with the GAAC's disposition of the matter, or if the grade appeal is not resolved within 35 calendar days after the written statement is submitted to the college, the student may further pursue the matter by requesting in writing that the university convene an Academic Appeals Resolution Committee to review the issue. This must be submitted within 10 calendar days of the notification from the college. This

committee has been designated as the final authority on these matters. Students may obtain information on this process by contacting the Office of the Provost.

Academic Dismissal Appeal

If a student wishes to dispute an academic dismissal, the first step is to consult the graduate director about appealing to the department/program. If and when all departmental appeals are exhausted, the student can enter the formal procedure at the college level.

The student will meet with the associate dean for graduate studies who will attempt to resolve the issue by working with the department/program. Contact the Graduate Office at gradcssh@northeastern.edu to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine if the complaint is substantive and there is just cause to convene the GAAC.

FORMAL COMPLAINT

The student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean. The statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student. The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint. Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the department/program director and convene a meeting of the GAAC. If the student fails to provide a thoughtful and well-reasoned written summary of the case, then the matter will be considered closed at the college level. In the event of an alleged violation of the Student Code of Conduct, the associate dean will first seek a determination of the violation from the Office of Student Conduct and Conflict Resolution (<https://osccr.sites.northeastern.edu/>).

The associate dean will make a good faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of their statement.

APPEALS MEETING

- The GAAC serves as the Academic Appeals Committee for the CSSH.
- The GAAC is convened in order to determine whether a fair and due process was used.

The student has the right to attend and present their case orally to the committee. The student isn't required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the GAAC may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. Lawyers are not permitted in these proceedings.

The student usually presents their complaint to the GAAC first. This is followed by a brief Q&A of the student by the GAAC. The GAAC may ask the complainant questions based upon either the written case submitted by the complainant or the complainant's oral presentation. The GAAC then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the GAAC believes it cannot resolve any issues without additional information, the GAAC may request any information needed from either the complainant or department/program. This information must be provided to the GAAC within one week of the meeting. If the needed information is not provided in the time frame required, then the GAAC may weigh this failure in making its final determination regarding the original complaint.

COMMITTEE PROCESS

- All decisions of the GAAC will be made based on a simple majority (51%) vote.
- Members of the GAAC from the student's own unit are recused from the appeal process.
- The associate dean is chair of the GAAC and only votes when there is a tie.
- The student bringing the complaint to the GAAC carries the burden of proof based on the weight of the evidence in demonstrating that the dismissal is incorrect or unjustified.
- If the GAAC decides that the academic dismissal should be revoked, the GAAC can request that the department reinstate the student immediately.

If the student is not satisfied with the GAAC's disposition of the matter, or if the dismissal appeal is not resolved within 35 calendar days after the written statement is submitted to the college, the student may further pursue the matter by requesting in writing that the university convene an Academic Appeals Resolution Committee to review the issue. This must be submitted within 10 calendar days of the notification from the college. This committee has been designated as the final authority on these matters. Students may obtain information on this process by contacting the Office of the Provost (<https://provost.northeastern.edu/>).

Doctor of Philosophy

The Doctor of Philosophy degree is awarded to candidates who give evidence of high scholastic attainment and research ability in their major field. Specific degree requirements are administered by a committee in charge of the degree program. It is the responsibility of the chair of this committee to certify to the college the completion of each requirement for each candidate. Note that advanced standing is determined at the time of admission by the graduate program director.

Continuity of Registration

Students are expected to maintain satisfactory progress toward their intended degree. All students must register as approved by their advisors or the departmental graduate program directors. After establishing degree candidacy, registration must be continuous until graduation requirements are complete unless a leave of absence is allowed by and recommended by the departmental graduate committee and approved by the college. For each of the first two semesters that a doctoral candidate has established candidacy, the student must register for Doctoral Dissertation. For each semester

beyond the two Dissertation registrations, the student must register for Doctoral Dissertation Continuation until the dissertation is approved by the college and submitted to ProQuest. During the terms when a student is registered for Doctoral Dissertation or Dissertation Continuation, coursework is not permitted as the course requirements for the degree have already been met. If the academic program requires enrollment in seminars or courses in addition to Dissertation or Dissertation Continuation, the graduate program director will make a recommendation to the college. Approval of the college must happen prior to registration. Students must be registered for Dissertation or Dissertation Continuation during the semester in which they take the final oral examination (including the full summer semester if that is when defense occurs). Any student who does not attend Northeastern University for a period of one year may be required to apply for readmission.

Awards

Funding eligibility is contingent upon making satisfactory progress. See the college's Regulations for All Students (p. 1244) page for more information.

Course Requirements

Course requirements in each doctoral program are specified by the committee in charge of the doctoral program and departmental regulations. These are detailed in the academic catalog for the student's term of entry.

GPA Requirements

For all College of Social Sciences and Humanities doctoral degree programs, the minimum cumulative grade-point average is 3.500. To qualify for the degree, the minimum cumulative GPA must be obtained. This average will be calculated each semester according to the grading system noted in the academic catalog and will exclude any transfer credits or repeated courses. Individual programs may have additional GPA requirements. These can be found in the academic catalog or program policies and procedure documents. A student who does not make satisfactory progress toward degree requirements, as specified by the individual department, may be placed on academic probation or dismissed from the program. A student cannot begin working on exam requirements with a GPA that is below the program minimum.

Annual Student Progress Review

All PhD degree students are required to meet with their faculty advisor for an annual student progress review. The reviews will be submitted to the departmental graduate committee, which will determine whether satisfactory progress is being made and students are eligible to proceed to complete their graduate work. The CSSH Graduate Office will receive a copy of each student's review.

Residence Requirement

All PhD students must spend the equivalent of at least one academic year in residence at the university as a full-time graduate student. The departmental graduate committee specifies the method by which the residence requirement is satisfied. Residency is required of all students receiving a stipended graduate assistantship.

Qualifying Examinations

In programs where comprehensive or qualifying exams are required, students must complete these requirements within the time limit set by the program.

Dissertation Proposal

All CSSH doctoral programs require an approved prospectus or successful proposal defense for candidacy.

Doctoral Degree Candidacy

PhD degree candidacy is established when students have completed all departmental requirements for candidacy. These requirements vary by department and include completing the minimum number of graduate semester hours required of doctoral students by the department (this may include an earned master's degree accepted by the department) and passing a qualifying examination and/or a comprehensive examination. All CSSH doctoral programs require an approved prospectus or successful proposal defense for candidacy. Once students reach doctoral degree candidacy, the program should notify the CSSH Graduate Office. Students will be certified, in writing, by the college and their record will be updated to reflect PhD candidacy was reached. Students will not be able to register for Dissertation I until candidacy has been posted to the student record. Registration in coursework is not permitted once a student reaches candidacy.

Doctoral Dissertation

Each doctoral student must complete a dissertation that embodies the results of extended research and makes an original contribution to the field. This work should give evidence of the candidate's ability to carry out independent investigation and interpret in a logical manner the results of the research. The method of approval of the dissertation is established by the departmental graduate committee. No dissertation committee shall have fewer than three faculty members, two of whom shall be from Northeastern. The chair of the dissertation committee will be a full-time tenured or tenure-track member of the faculty of Northeastern and will hold an appropriate doctorate. A research faculty member may chair a dissertation committee if the faculty member holds an appropriate doctorate and has received the approval to do so from the tenured and tenure-track faculty members of the unit(s) in which their appointment resides.

Final Oral Examination

The final oral examination will be on the subject matter of the doctoral dissertation and on important developments in the field of the dissertation. Other fields may be included if recommended by the examining committee. This examination will be taken after completion of all other degree requirements and must be held at least four weeks prior to the commencement at which the degree is to be awarded. All internal and external

committee members are expected to participate in the defense. The college must be notified of all scheduled defenses and expects that the defense will be publicly advertised for at least two weeks prior to the scheduled date. Some programs may require up to 30 days' notice.

- Upon successful defense of the dissertation, the student must have a dissertation approval record signed by the members of the dissertation committee and the department chair.
- The student must have the dissertation approval record approved by a representative from the CSSH Graduate Office.
- The student must submit an electronic copy of the dissertation to ProQuest, following the directions outlined on the University Library website.
- Visit Thesis and Dissertation Formatting Guidelines (<https://cssh.northeastern.edu/resources/theses-and-dissertations/>) for the approval form template and additional guidance.

General Information

For information about other academic policies and procedures; student responsibilities; student academic and cocurricular life; faculty rights and responsibilities; or general personnel policies, benefits, and services, please refer to university policies (p. 87) and related procedural guides, as appropriate.

Student Classification

Regular student—Students who are admitted to a degree or certificate program.

Special student—Nonmatriculated students who are enrolled in College of Social Sciences and Humanities graduate courses on a part-time basis (fewer than 8 semester hours per semester). Special students may earn up to 12 semester hours over time. Special students who do not register for four consecutive semesters (excluding summer semester) may be subject to review and possible withdrawal by the college. Graduate certificates and degrees cannot be conferred upon students in special student status. In keeping with university regulations, international students cannot be admitted as special students.

Doctoral degree candidate—Doctoral students who have completed departmental, college, and university requirements except for dissertation.

Student Status

For academic purposes, a graduate student is considered a full-time student if enrolled in a minimum of 8 semester hours of credit for the semester, with the following exceptions:

- Students who hold Stipended Graduate Assistantships will be considered full time if enrolled for a minimum of 6 semester hours of credit. However, some departments may require more credits for maintaining departmental progression standards.
- Students enrolled in Doctoral Research or full-time co-op are considered full time.
- All graduate students who are formally registered in a continuation status—Dissertation, Dissertation Continuation, Doctoral Research, or Qualifying/Comprehensive Exam Preparation courses—may be considered full time. It is ordinarily assumed that such students will be in residence.
- Students in their last semester of coursework may be enrolled in fewer than 8 semester hours to complete degree requirements. *Note:* To be eligible for some types of financial aid, the minimum full-time load may be defined differently. For information, contact the Graduate Student Financial Services Office (<https://studentfinance.northeastern.edu/>).

Continued registration in the CSSH is contingent upon receiving all official transcripts and test scores within 30 days of matriculation. Please note that you may be asked to provide us with these if you did not include official copies in your application.

Grading System

The student's performance in graduate courses will be graded according to the following numerical equivalents in the Academic Catalog (p. 115).

Grading Policies

Grading policies applying to all students may be found in the Academic Catalog (p. 87).

In the CSSH, not more than two courses or 8 semester hours of credit, whichever is greater, may be repeated to satisfy the requirements for the degree. Only such repeats will be counted in calculating the cumulative grade-point average. No grade changes are permitted after the end of the final examination period one calendar year from the semester in which the student registered for the course. This includes the clearance of incomplete grades (p. 123). In calculating the overall cumulative average, all graduate-level coursework completed at the time of clearance for graduation will be counted.

Students cannot elect a satisfactory/unsatisfactory grading scheme for CSSH courses unless the course grading scheme is designated satisfactory/unsatisfactory.

Class Credits

All credits are entered as semester hours. Graduate office policy states that in calculating the overall GPA, all graduate-level coursework completed at the time of clearance for graduation will be counted unless otherwise designated at the time of registration or unless counted toward a previous degree.

Master's Degrees

Academic Requirements

A candidate for the master's degree must complete a minimum of 30 semester hours of graduate-level coursework and additional requirements as determined by the department in which the student is registered.

To qualify for the degree, a minimum cumulative average of 3.000, equivalent to a grade of B, must be obtained. This average will be calculated each semester according to the university grading system (p. 115) and will exclude any transfer credits and nonrepeatable courses that have been retaken. A student who does not make satisfactory progress toward degree requirements, as specified by the individual department, may be dismissed from the program.

Continuity of Registration

Students are expected to maintain satisfactory progress toward their intended degrees. All students must be registered in the last semester of their program. Any student who does not attend Northeastern University for a period of one year will be required to apply for readmission.

Comprehensive Examination

Some programs require a final written or oral comprehensive examination. This examination will be given by the department concerned at least two weeks before the commencement at which the degree is expected. Students should check with individual departments for specific guidelines.

Thesis

Some programs require or offer master's degree Thesis. Theses should demonstrate the individual's capacity to execute independent work based on original material. Registration for XXXX 7990 Thesis is required. In cases in which a grade is required, theses must receive a grade of B (3.000) or better to be accepted. Students who have not completed their theses after having registered for the specified number of thesis credits must register for XXXX 7996 Thesis Continuation in the subsequent semester. Thesis Continuation will carry no credit but will be recorded on the student transcript with the appropriate grade (Satisfactory or Unsatisfactory). Thesis Continuation is not repeatable.

- Upon successful defense of the thesis, the student must have a thesis approval record signed by the members of the thesis committee. Visit Thesis and Dissertation Formatting Guidelines (<https://cssh.northeastern.edu/resources/theses-and-dissertations/>) for the approval form template and additional guidance.
- The student must have the thesis approval record approved by a representative from the CSSH Graduate Office.
- The student must submit an electronic copy of the thesis to ProQuest, following the directions outlined on the University Library website.

Regulations for All Students

Registration

Students must register via the Student Hub (<https://me.northeastern.edu>). Procedures to do so are available on the Office of the University Registrar's website. Consult the Academic Calendar (<https://registrar.northeastern.edu/group/calendar/>) for important registration dates.

Students are encouraged to obtain advisor approval of course selections each semester. Students should check with individual departments for specific guidelines.

Students are expected to only complete the courses and semester hours required for the degree or certificate. Any courses taken outside of those requirements must be approved by the director of the graduate program.

Transfer Credit

For general regulations concerning transfer credit in Northeastern University's graduate degree programs, please visit Regulations and Requirements for All Graduate Degree Programs (p. 143).

Degree students may petition to transfer credit through their departments to the College of Social Sciences and Humanities Graduate Office by completing the Transfer Credit form on the Office of the University Registrar's website. An official transcript must be attached to the petition.

Awards

Only those students who are registered in degree programs are eligible for awards. Award recipients will receive an official award letter from the CSSH Graduate Office. Please pay attention to this letter as it is an official contract that should be read carefully. In order to maintain awards, students must be making satisfactory progress toward their degrees. Please refer to the Satisfactory Academic Progress section below for more information.

Students receiving a Stipended Graduate Assistantship must be in full-time status and be registered for a minimum of 6 semester hours. The standard duration of the SGA funding window is five years beginning from the time of admission and is not changed based on the source of funding or if the stipend is declined in any given semester(s). The health plan fee (NUSHP) is covered by the SGA award whereas the University Health and Counseling Services fee is not. Students on an SGA must be available to come to campus during normal business hours and are expected to spend 20 hours per week supporting their assignment. Unsatisfactory progress in either the graduate program or performance in assistantship-related duties or any

deviation from the above may result in the early termination of the assistantship. Near the end of each funded term, student performance will be evaluated by their assignment supervisor and that evaluation will be filed with the CSSH Graduate Office.

CSSH Dean's Scholarship and Excellence Fellowship recipients must be in full-time status and be registered for a minimum of 8 semester hours.

Withdrawal from Courses

To withdraw from a course, a student must drop the course via the Student Hub within the deadlines as established by the Office of the University Registrar. Consult the Academic Calendar (<https://registrar.northeastern.edu/group/calendar/>) for more information.

Satisfactory Academic Progress

Satisfactory academic progress means satisfying requirements in the graduate program's general regulations and in the regulations specified by each department.

The college sets minimum standards for all students to fulfill, including:

- Maintaining the graduation requirement of a cumulative grade-point average of 3.000 (3.500 for doctoral programs) in their coursework
- Timely completion of coursework
- Timely completion of comprehensive/qualifying examinations

Departments and programs may have additional requirements that exceed those of the college. These requirements can be found in the *Academic Catalog* and department guides. Failure to maintain satisfactory academic progress may result in academic probation or dismissal from the program.

Receipt of financial support administered by the college is contingent on satisfactory academic progress toward the degree and on meeting department-specific guidelines. The college requires that all students receiving awards will generally have two semesters to reach a 3.000 GPA. Students whose cumulative GPA is below 3.000 (3.500 for doctoral programs) will be reviewed by their departments and by the CSSH Graduate Office and may have their funding terminated on recommendation of their department or by decision of the college in consultation with their department. In addition, continued funding for SGAs is contingent on satisfactorily carrying out duties as assigned.

Students enrolled in a program offering a cooperative education or internship option must be approved to participate. A minimum GPA of 3.000 is required at the time the co-op job or internship begins. Some departments may require a higher minimum GPA for co-op. Please refer to the *Academic Catalog* for program-specific information.

Leave of Absence

Full-time students who will not be involved in any academic endeavor for a period of time are required to petition via the Request for Leave of Absence form on the Student Hub (<https://me.northeastern.edu>). The CSSH Graduate Office will not accept retroactive leave requests. Please note that if a student is requesting a leave for medical reasons (p. 120), a Medical Leave of Absence form must be completed. Students should contact University Health and Counseling Services.

Leaves of absence generally are not approved for more than one calendar year. Further, a leave of absence is generally not appropriate for an international student on a student visa, unless the student is leaving the United States. The student must consult with an international student advisor at the Office of Global Services.

Leaves of absence are not appropriate for master's or doctoral students who are working on a thesis or dissertation but are away from the Northeastern campus.

Except in the case of medical leaves, being on an approved leave of absence does not extend the amount of time allowed for degree completion or the makeup of incomplete grades.

For more information on the general leave of absence policy for Northeastern's graduate degree programs, please visit Leaves of Absence and University Withdrawal (p. 120).

Time Limitations

Graduate course credits earned in the program of graduate study or accepted by transfer are valid for a maximum of seven years.

If students wish to apply for an extension of the university's seven-year time limit, they must submit a petition to their department of study. The petition must include a detailed plan for the completion of all remaining degree requirements. In the case of master's time-limit extension requests for coursework, the department must certify that the content of each of the courses has not changed since the time the student completed the course. If deemed appropriate, the department will recommend the approval of an extension to the college. The associate dean has final approval of time-limit extensions.

Application for the Diploma

Application for the diploma is made by applying to graduate. More information is available on the Commencement website (<https://commencement.northeastern.edu/>). Even if all other degree requirements may have been met, the application to graduate must be completed in order to assure that the degree will be conferred on the appropriate graduation date. It is the responsibility of the student to make sure that degree

requirements have been met. Once degree requirements have been met, the student will be cleared for commencement. Please note that there are no honors distinctions awarded at the graduate level.

Changes in Requirements

The continuing development of the college may result in regular revision of curricula. When curriculum changes are made, students are allowed to complete the degree requirements of the program when they matriculated. If a student wishes to complete the degree requirements of the new curriculum, the student may request this in writing to the CSSH Graduate Office via gradcssh@northeastern.edu.

School of Criminology and Criminal Justice

Website (<https://cssh.northeastern.edu/sccj/>)

Amy Farrell, PhD

Professor and Director

Kevin Drakulich, PhD

Professor and Associate Director

617.373.3327

617.373.8723 (fax)

sccj@northeastern.edu

CSSH Graduate Programs General Regulations (p. 1239)

The School of Criminology and Criminal Justice prepares students for meaningful careers in criminology, justice policy, the law, criminal justice, and related fields, including professional research careers. We do this by applying multidisciplinary social science tools that predict and explain crime, as well as deepening the understanding of policies that improve our systems of justice. Our approach is experiential, and our methods for teaching are rooted in knowledge creation as a top-tier research program. Our goal is to create ethical problem solvers who are prepared to tackle important crime and justice issues facing society. Our educational goals for students include a commitment to identify and address the role of systemic racism and intersecting dimensions of oppression in the development and application of justice system policies and practices, crime and justice theory, and research.

The school offers a Master of Science degree in criminology and criminal justice and a PhD degree in criminology and justice policy. In addition, the school offers a JD/MS in criminology and criminal justice program and a JD/PhD in criminology and justice policy in conjunction with the School of Law.

Programs

Doctor of Philosophy (PhD)

- Criminology and Justice Policy (Boston) (p. 1246)

Master of Science (MS)

- Criminology and Criminal Justice (Boston) (p. 1249)

Dual Degrees

- Law, JD/Criminology and Justice Policy, PhD (Boston) (p. 984)
- Law, JD/Criminology and Criminal Justice, MS (Boston) (p. 984)

Graduate Certificate

- Crime Analysis and Mapping (Boston) (p. 1251)

Criminology and Justice Policy, PhD (Boston)

The doctoral program in criminology and justice policy at the School of Criminology and Criminal Justice at Northeastern University seeks to prepare students for professional and research careers in criminal justice, criminology, and related fields by applying multidisciplinary and comparative social science to understand, predict, and explain crime and contribute to the development of public policy within urban communities. Using an active-learning approach, the school seeks to develop its students intellectually and ethically, while providing them with a keen appreciation for the complexities of crime and public and private efforts to make communities safer and to ensure justice.

The program is full time and is small and student centered. Students may enter the program with either a bachelor's degree or a master's degree. It is expected that students will be able to complete the program in four to five years, and students entering with a master's degree will be able to complete the program in three to five years.

Year one in the doctoral program offers students an opportunity to obtain a broad foundational knowledge in the discipline: one semester on theories of criminal justice process, two semesters of criminological theory, two semesters of statistics, and one semester of advanced research methods. To ensure that all students have mastered the foundational material emphasized across the required courses for the PhD program and can successfully integrate theory, research, and policy, all PhD students take a “foundations” qualifying examination at the end of their first year in the doctoral program.

After demonstrating mastery of the foundational knowledge in year one, students devote themselves to a more specific area of research in years two and three. Students demonstrate this commitment through the second and third qualifying examinations: an area exam and a publishable paper.

Following successful completion of the three qualifying examinations, and required and elective course work, the students proceed to a formal dissertation proposal defense.

Doctoral Degree Candidacy

A student achieves candidacy when they have successfully completed all course work (54 semester hours for students entering with a bachelor's degree or 42 semester hours for students entering with advanced standing), passed all three qualifying examinations, and deposited the final version of their dissertation proposal (approved by their full committee) with the school's graduate program office. Candidacy is certified, in writing, by the college.

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review

Three qualifying examinations—foundations exam, area exam, and publishable paper

Dissertation committee

Dissertation proposal

PhD candidacy

Dissertation defense

Core Requirements

Code	Title	Hours
Pro-Seminar		
CRIM 7001	PhD Pro-Seminar in Criminology and Justice Policy 1	0
CRIM 7002	PhD Pro-Seminar in Criminology and Justice Policy 2	0
Criminal Justice Process		
CRIM 7203	Theories of Criminal Justice Process	4
Criminological Theory		
CRIM 7710	Criminology and Public Policy 1	4
CRIM 7711	Criminology and Public Policy 2	4
Analysis & Methods		
INSH 7300	Advanced Research Methods in the Social Sciences and Humanities	4
INSH 7400	Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4
Practicum		
CRIM 7706	Practicum in Writing and Publishing	2
CRIM 7700	Practicum in Teaching	0

Electives

Code	Title	Hours
Complete 28 semester hours in the following ranges. Courses in additional disciplines with PhD program director approval.		28
CRIM 6000 to CRIM 7999		
INSH 6000 to INSH 7999		
POLS 6000 to POLS 7999		
PPUA 6000 to PPUA 7999		
SOCL 6000 to SOCL 7999		

Dissertation

Code	Title	Hours
Exam Preparation		
Students register for CRIM 8960 when they have completed required coursework but are still taking qualifying exams, and for CRIM 8986 when they have passed qualifying exams and are working on proposals.		
CRIM 8960	Exam Preparation—Doctoral	
CRIM 8986	Research	
Dissertation		
CRIM 9990	Dissertation Term 1	
CRIM 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of CRIM 9990 and CRIM 9991, registration in the following class is required in each subsequent semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
CRIM 9996	Dissertation Continuation	

Program Credit/GPA Requirements

54 total semester hours required

Minimum 3.500 GPA required

Advanced Entry Program Requirements**Advanced Degree Entrance**

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review

Three qualifying examinations—foundations exam, area exam, and publishable paper

Dissertation committee

Dissertation proposal

Candidacy achieved

Dissertation defense

Core Requirements

Code	Title	Hours
Pro-Seminar		
CRIM 7001	PhD Pro-Seminar in Criminology and Justice Policy 1	0
CRIM 7002	PhD Pro-Seminar in Criminology and Justice Policy 2	0
Criminal Justice Process		
CRIM 7203	Theories of Criminal Justice Process	4
Criminological Theory		
CRIM 7710	Criminology and Public Policy 1	4
CRIM 7711	Criminology and Public Policy 2	4
Analysis & Methods		
INSH 7300	Advanced Research Methods in the Social Sciences and Humanities	4
INSH 7400	Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4
Practicum		
CRIM 7706	Practicum in Writing and Publishing	2
CRIM 7700	Practicum in Teaching	0

Electives

Code	Title	Hours
Complete 16 semester hours in the following range.		16
CRIM 6000 to CRIM 7999		
INSH 6000 to INSH 7999		
POLS 6000 to POLS 7999		

PPUA 6000 to PPUA 7999

SOCL 6000 to SOCL 7999

Dissertation

Code	Title	Hours
Exam Preparation		
Students register for CRIM 8960 when they have completed required coursework but are still taking qualifying exams, and for CRIM 8986 when they have passed qualifying exams and are working on proposals.		
CRIM 8960	Exam Preparation—Doctoral	
CRIM 8986	Research (Exam Preparation)	
Dissertation		
CRIM 9990	Dissertation Term 1	
CRIM 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of CRIM 9990 and CRIM 9991, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
CRIM 9996	Dissertation Continuation	

Program Credit/GPA Requirements

42 total semester hours required

Minimum 3.500 GPA required

Criminology and Criminal Justice, MS (Boston)

The master's program in criminology and criminal justice at Northeastern University concentrates both on the problem of crime as a form of deviant behavior and on the criminal justice and private security systems that deal with it. The program emphasizes a systems approach to criminal justice, stressing policy development and analysis, as well as the impact these policies have on the individuals and organizations charged with delivering justice in a fair and equitable manner. In concept and scope, the MS degree encompasses such related disciplines as law, sociology, political science, psychology, criminology, and public administration.

The master's program is comprised of required courses encompassing both substantive and technical skills. Additionally, students choose elective courses from offerings within the graduate program in criminal justice or in other graduate programs in the College of Social Sciences and Humanities. The course offerings afford students the flexibility to customize their own programs, which may include an internship, directed study, or master's thesis.

For students interested in criminal justice in an increasingly digital world, the Master of Science in Criminology and Criminal Justice with a Concentration in Cybersecurity offers a strong criminal justice foundation coupled with the conceptual and practical skills that enable them to contribute to ensuring the reliability and security of cyberspace. Successful students will learn the principles, practices, and responsibilities of criminal justice professionals alongside the fundamental knowledge of computer science skills necessary for practical applications in the field. The concentration in cybersecurity provides criminal justice students an opportunity to learn how social behavior, policy, and legal rules can affect cybersecurity and the tools of information technology.

Faculty members in the graduate program represent several different academic disciplines, and teaching activities vary in nature depending on the instructors' specific objectives. The faculty's specialized interests help make possible a broad range of program offerings including courses on the criminal justice process, victimology, security management, criminal law, juvenile justice, law and psychology, and terrorism.

The master's program offers an optional cooperative education experience to eligible students. Students extend the two-semester program to 18 months through a co-op work experience and Experiential Integration (INSH 6864), the associated experiential integration course. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Briefly stated, the graduate program endeavors to:

- Assist in developing criminal justice and private security leaders capable of assuming responsibility for policy planning and administration
- Offer students an opportunity to acquire the necessary skills and knowledge to conduct applied research while assisting them in developing the ability to apply this research in a variety of criminal justice settings
- Provide an opportunity for a solid educational foundation for those who wish to pursue more advanced graduate study beyond the Master of Science degree

Graduate study in criminology and criminal justice may be pursued on either a full- or part-time basis. All candidates for the Master of Science in Criminology and Criminal Justice degree must successfully complete a minimum of 32 semester hours of credit in coursework.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Required Core		
CRIM 6200	Criminology	4
CRIM 6202	The Criminal Justice Process	4
Research and Statistics		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4

Electives

Code	Title	Hours
Complete 16 semester hours in the following ranges:		16
CRIM 5000 to CRIM 7999		
INSH 5000 to INSH 7999		
POLS 5000 to POLS 7999		
PPUA 5000 to PPUA 7999		
SOCL 5000 to SOCL 7999		

The following courses may also count as electives toward the program:

ARTG 6460	Human-Centered AI
CS 5047	Exploring AI Trends and Tools
EDUT 6150	AI in Education
HLTH 5800	AI Across the Health Sciences
IE 5640	Data Mining for Engineering Applications
JRNL 6460	AI in Media Industries
MISM 6250	Strategic AI for Business
PHIL 5110	Responsible AI

Optional Concentration in Cybersecurity

Students adding a concentration in cybersecurity must use 12 semester hours of their elective credits to complete the following courses:

Code	Title	Hours
Required		
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	4
Complete two of the following:		8
CRIM 6262	Evidence-Based Crime Policy	
CY 5010	Cybersecurity Principles and Practices	
CY 5200	Security Risk Management and Assessment ¹	
CY 5210	Information System Forensics ¹	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5250	Decision Making for Critical Infrastructure	

¹ Instructor approval

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.		1-2
CRIM 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

32 total semester hours required (33-34 with optional co-op)

Minimum 3.000 GPA required

Law, JD / Criminology and Justice Policy, PhD (Boston)

The JD/PhD program will expand the knowledge base and career options of students. The disciplines of criminology and justice policy and law share common interests in identifying opportunities to create conditions for justice, equality, and societal well-being. The dual degree will provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the sociopolitical, legal, and economic context in which they are found. Solving problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

Up to 16 credits of coursework in the dual-degree program can be counted toward both the JD degree and the PhD degree. Of these 16 credits, no more than 12 credits of non-law courses can count toward the JD degree.

Students will take law courses during semesters spent in the law school. Students will take criminology courses during semesters spent in SCCJ. Please consult the School of Law (<https://www.northeastern.edu/law/>) for more information about JD requirements. Additionally, please consult SCCJ (<https://cssh.northeastern.edu/sccj/>) for more information about PhD requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Law, JD / Criminology and Criminal Justice, MS (Boston)

The JD/MS program will expand the knowledge base and career options of students. The disciplines of criminal justice and law share common interests in identifying opportunities to create the conditions for justice, social equality, and societal well-being. The dual degree is designed to provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the social, political, legal, economic context in which they are found. Solving these problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

Up to 16 credits of coursework in the dual-degree program can be counted toward both the JD degree and the MS degree. Of these 16 credits, no more than 12 credits of non-law courses can count toward the JD degree.

Students will take law courses during semesters spent in the School of Law. Students will take criminology courses during semesters spent in the School of Criminology and Criminal Justice. Please consult the School of Law (<https://www.northeastern.edu/law/>) for more information about JD requirements. Additionally, please consult SCCJ (<https://cssh.northeastern.edu/sccj/>) for more information about MS requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Crime Analysis and Mapping, Graduate Certificate (Boston)

The Graduate Certificate in Crime Analysis and Mapping is a response to calls to integrate data-driven policing into the organizational culture of public safety agencies. Crime analysis is a deep examination of the criminogenic factors that help us understand why crime occurs. Crime mapping is a key component of crime analysis that is used by law enforcement, city planners, urban planners, corporate risk and enterprise professionals, and public health specialists to map, visualize, and analyze crime incident patterns. Together, sound crime analysis and crime mapping diagnose problems to facilitate tailored responses to crime and to reduce the frequency and severity of crime problems. Sound crime analysis allows for granular assessments of crime problems, which can facilitate the development of public safety programs in a manner that minimizes the risk for unintended harmful effects in the community. Crime analysis and mapping are key components of evidence-based programs that simultaneously promote crime prevention and social justice. This certificate is designed to contribute to students' understanding of how to critically assess crime patterns and connect crime data to other geographic data in order to inform prevention activities and efforts to improve public safety and security and to present the ways in which data management, geospatial and temporal crime data, and map construction can be used to develop crime policy.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CRIM 6801	Fundamentals of Crime Analysis and Mapping	4
CRIM 6802	Data Management for Social Scientists	4

Electives

Code	Title	Hours
Complete 4 semester hours from the following:		4
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	
INSH 6304	Modeling and Analyzing Social Networks	
INSH 6406	Analyzing Complex Digitized Data	
PPUA 5262	Big Data for Cities	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6509	Techniques of Program Evaluation	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Economics

Website (<https://cssh.northeastern.edu/economics/>)

Michael Stone, PhD

Teaching Professor and Interim Chair

617.373.2882

gradecon@northeastern.edu

CSSH Graduate Programs General Regulations (p. 1239)

The Department of Economics offers both a Master of Science and a Doctor of Philosophy in Applied Economics. The most distinctive feature of these programs is their emphasis on applied economics, coupled with attention to providing a solid grounding in microeconomic and macroeconomic theory, and econometrics. Students come from all over the world, and the curriculum is designed with this in mind, striving for balance in coverage of economies that are rich and poor, large and small, mixed and market. This gives a unique flavor to the course of study, making it well suited to the analysis of the emerging global economy of the 21st century.

The Master of Science program is in applied economic policy analysis, with broad specialization areas. The program is large enough to support a full slate of core and area courses each year, yet small enough to maintain a sense of community among the students.

The program is especially appropriate for those who wish to work in or return to positions in government, teaching, finance, or industry while providing a rigorous basis for those who want to continue their studies to the doctoral level.

Our signature co-op program offers qualified MS students the opportunity to apply for paid work positions as practicing economists for up to six months as part of their academic program. This paid work experience enhances our MS degree and its emphasis on application. Students have an opportunity to learn how to apply their knowledge, solve problems, and make a difference in the world before they graduate. Our graduates either find full-time work in their area of specialty or go on to earn additional graduate degrees. All of our graduates find jobs after completing our program.

Master of Science students may choose to pursue a concentration in data science. The concentration strategically combines econometrics and machine learning techniques to analyze and predict outcomes with Big Data. Students in Seattle are required to select this concentration.

Our master's program-specific learning courses also feature "tracks." Along with the core MS classes, these informal tracks help our students prepare for different career paths. The Department of Economics currently offers three tracks (<https://cssh.northeastern.edu/economics/program/ms-graduate-program/available-tracks/>):

- Policy
- Quantitative analysis
- Academic

The PhD program is small and focused, and we welcome applications from those with a bachelor's or master's degree who have had prior training in macroeconomic and microeconomic theory and possess strong quantitative skills. Students take core course sequences in microeconomics, macroeconomics, and econometrics, followed by field course sequences in their second year. Students take field coursework in:

- Industrial organization, competition policy, and regulation
- Labor economics

In addition to industrial organization and labor, students take field courses, when available, in other research areas, including development economics.

Programs

Doctor of Philosophy (PhD)

- Economics (Boston) (p. 1253)

Master of Science (MS)

- Economics (Boston) (p. 1256)
- Economics (Seattle) (p. 1258)

Economics, PhD (Boston)

The PhD program in economics offers specializations in *industrial organization, competition policy, and regulatory economics* and *labor economics*.

Timeline

The PhD program for each student has two phases: the coursework phase followed by the dissertation phase. The coursework phase consists of required coursework and field courses, as well as taking and passing the three qualifying examinations.

A student moves into the dissertation phase upon successful completion of required coursework and upon passing the qualifying examinations. In the dissertation phase the student must prepare a dissertation proposal and present and defend the dissertation proposal before the student's proposal review committee. A student who successfully defends the dissertation proposal achieves candidacy. At the end of the dissertation phase, the student must defend their completed dissertation.

Coursework

Students entering the doctoral program will take seven core classes (28 semester hours), two classes in each of two doctoral fields (16 semester hours), and one elective (4 semester hours), for a total program requirement of 48 semester hours.

Core courses are focused on developing an advanced theoretical and quantitative foundation (macroeconomic theory, microeconomic theory, and applied econometrics). The remainder of the coursework is focused on the sophisticated application of analytical tools in the chosen field of concentration.

PhD students are expected to take three classes per semester as necessary to meet the degree's coursework requirements in the minimum number of semesters.

Field Coursework and Grade Requirement

Students must take four field courses, and they are strongly encouraged to take as many field courses as possible. Students should plan to take the two labor and two industrial organization courses, even if they arrange to do a field in development or health economics. Students interested in customizing their fieldwork should consult the PhD Program Guidelines on the website.

To maintain satisfactory standing in the PhD program, students must earn a grade of B or higher in at least four field courses. Students who do not earn a B in at least four field courses will be offered one opportunity to meet the grade standard. Consult PhD Program Guidelines on the website for further details.

Examinations

THREE QUALIFYING EXAMINATIONS—MACROECONOMICS, MICROECONOMICS, AND ECONOMETRICS

Three qualifying examinations are required upon completion of Macroeconomics 2, Microeconomics 2, and Econometrics 2. Students must receive a minimum grade of B– in the associated theory class to sit for its exam. Students are given a maximum of two attempts to pass each exam to continue in the program. Failure to sit for an exam at the appropriate time without prior consent of the graduate program director will result in an automatic fail on that exam.

Proposal Review

Students must complete the proposal review within two years of finishing their coursework; however, the department expects that a doctoral candidate's **dissertation committee** will be formed and the dissertation proposal presented within one year of reaching degree candidacy, which is normally by the end of the student's third year.

A **dissertation proposal** states the question or hypothesis, reviews the relevant literature, and explains how the proposed work will contribute to that literature and general understanding. The proposal sets forth data sources, models, and econometric issues in sufficient detail so that any faculty member not in the field will be able to assess its merits. Normally, the proposal should not exceed 30 double-spaced pages. The proposal is first approved by the dissertation committee and then presented at an open seminar.

Consult PhD Program Guidelines on the website for further details.

Doctoral Degree Candidacy

Upon successful completion of the proposal review, the student becomes a degree candidate. Candidacy may make the student eligible for a higher stipend and is an essential step in making satisfactory progress. Degree candidacy must be achieved within two years of completion of required coursework.

DISSERTATION

Students must complete their dissertation defense within five years of finishing their coursework, and postponing the proposal review does not alter the total time that students may use to complete their PhD. Under extenuating circumstances, a student may request an extension of this time frame from the Graduate Office.

One month in advance of the prospective date of the defense, the completed dissertation that is to be defended must be circulated to the committee members. At that time, all members of the committee must sign off on their agreement that the dissertation is ready for defense. Each student will have a dissertation committee chaired by a faculty member with an appointment in the economics department and at least two other members. Committees may have two cochairs. Committees should not have more than four members (except at interim stages if faculty are leaving the committee). Committees may include members outside the economics department, but at least two committee members must have an appointment in the economics department. The composition of the committee should be set before the proposal review and again, if changes occur, before the dissertation defense. Committee compositions must be approved by the graduate program director and department chair.

The dissertation defense normally takes place during the student's fifth year. Those who have not defended by the end of their fifth year must submit a status report and timetable for approval by their dissertation advisor and the PhD program director. Consult PhD Program Guidelines on the website for further details.

WRITING THE DOCTORAL DISSERTATION

Writing the dissertation entails working with the principal advisor and other committee members until it is determined that a dissertation is complete and the candidate is ready to present and defend the work at an open seminar. Candidates must arrange a date and time for the defense at least three weeks in advance. Students must familiarize themselves with the Theses and Dissertations Formatting Guidelines (<https://cssh.northeastern.edu/resources/theses-and-dissertations/>). The guide provides links to formatting tips, sample introductory pages, sample approval record, and deadlines. In addition, a checklist is provided to ensure students have fulfilled the required steps in the commencement clearance process.

Milestones

Maintaining satisfactory academic progress during doctoral candidacy requires the following:

PHD ANNUAL STUDENT PROGRESS REVIEW

Each PhD student will have an annual review of their progress toward the degree. Receipt of financial support administered by the graduate school is contingent upon satisfactory academic progress toward the degree and satisfactory performance in assigned duties. See the CSSH General Regulations (p. 1239) for further details.

FIELD WORKSHOP PARTICIPATION

All PhD students registered for Doctoral Dissertation or Continuation who are in residence are expected to regularly attend a field seminar in industrial organization or labor. These seminars meet roughly every week, and their purpose is to assist students in choosing and evaluating dissertation topics as well as advancing and completing their dissertation. All doctoral candidates will be expected to present their research at various stages of writing their dissertation.

SEMINAR SERIES PARTICIPATION

All PhD students registered for Doctoral Dissertation or Continuation who are in residence are expected to regularly attend academic seminars by speakers invited to campus through the Department of Economics Seminar Series. Participation in these seminars is an important component of doctoral training and is intended to expose students to current research in their field while helping to develop and hone their own presentation skills.

PRACTICAL EXPERIENCE IN APPLIED ECONOMICS PROGRAM

Participation in at least one semester of the Practical Experience in Applied Economics program is required of all students who have reached doctoral candidacy. The program is offered in the spring semester every other year. In this program, a variety of prominent practitioners working in consulting and government agencies in the fields of industrial organization and labor will describe their practical experience applying economics to a variety of consulting and policy problems, including antitrust, regulation, labor market policy, education, and health policy. This is a participatory class that will require advanced reading and preparation of questions for the practitioners in addition to other assignments.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Three qualifying examinations—microeconomics, macroeconomics, and econometrics

Annual reviews

Dissertation committee

Dissertation proposal

Dissertation defense

Field workshops (and present following completion of coursework)

Economics Seminar Series and Job Talks

Practical Experience in Economics series

Core Requirements

Code	Title	Hours
Quantitative		
ECON 6105	Advanced Mathematics and Statistics for Economists	4
ECON 6140	Advanced Applied Econometrics	4
ECON 7740	Applied Econometrics 2	4
Theory		
ECON 6110	Advanced Microeconomic Theory	4
ECON 6120	Advanced Macroeconomic Theory	4
ECON 7710	Microeconomic Theory 2	4
ECON 7720	Macroeconomic Theory 2	4
Field		
To maintain satisfactory standing in the PhD program, students must earn a grade of B or higher in at least four field courses.		
<i>Labor Economics Field</i>		
ECON 7763	Labor Market Analysis	4
ECON 7764	Topics in Labor Economics	4
<i>Industrial Organization Field</i>		
ECON 7771	Framework of Industrial Organization	4
ECON 7772	Public Policy Toward Business	4

Elective

Code	Title	Hours
Complete 4 semester hours from the following:		4
ECON 7200 to ECON 7299		
ECON 7976	Directed Study	

Dissertation

Code	Title	Hours
Proposal Stage		
ECON 9986	Research	
Dissertation Candidacy Stage		
ECON 9990	Dissertation Term 1	
ECON 9991	Dissertation Term 2	
Following completion of ECON 9990 and ECON 9991, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
ECON 9996	Dissertation Continuation	

Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.500 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Three qualifying examinations—microeconomics, macroeconomics, and econometrics|

PhD annual student progress review

Meet minimum 3.000 grade requirement in at least four field classes to attain doctoral degree candidacy

Dissertation committee

Dissertation proposal

Dissertation defense

Field workshop participation throughout program (and required following completion of coursework)

Economics Seminar Series participation throughout program

Core Requirements

Code	Title	Hours
Quantitative		
ECON 7740	Applied Econometrics 2	4
Theory		
ECON 7710	Microeconomic Theory 2	4
ECON 7720	Macroeconomic Theory 2	4
Field		
<i>Labor Economics Field</i>		
ECON 7763	Labor Market Analysis	4
ECON 7764	Topics in Labor Economics	4
<i>Industrial Organization Field</i>		
ECON 7771	Framework of Industrial Organization	4
ECON 7772	Public Policy Toward Business	4

Elective

Code	Title	Hours
Complete 4 semester hours from the following:		4
ECON 7200 to ECON 7299		
ECON 7976	Directed Study	

Dissertation

Code	Title	Hours
Proposal		
ECON 9986	Research	
Dissertation		
Registration in the following class is required in the fall and spring semesters following achievement of doctoral candidacy:		
ECON 9990	Dissertation Term 1	
ECON 9991	Dissertation Term 2	
Following completion of ECON 9990 and ECON 9991, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
ECON 9996	Dissertation Continuation	

Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.500 GPA required

Economics, MS (Boston)

The Master of Science in Economics program focuses on applied economic policy analysis, with broad specialization areas. The program is large enough to support a full slate of core and area courses each year, yet small enough to maintain a sense of community among the students. The program is especially appropriate for those who wish to work in or return to positions in government, teaching, finance, or industry while providing a rigorous basis for those who want to continue their studies to the doctoral level.

The Master of Science in Economics offers the opportunity for master's students to apply for paid work positions through Northeastern University's world-famous co-op program. Qualified and approved master's students can participate in co-op as practicing economists for up to six months as part of their academic program (note that a minimum GPA of 3.000 is required in order to apply). This paid work experience enhances the degree and its emphasis on application. Students have an opportunity to learn how to apply their knowledge, solve problems, and make a difference in the world before they graduate. Our graduates either find full-time work in their area of specialty or go on to earn additional graduate degrees. All of our graduates have found jobs after completing our program. For more information, please visit the Master of Science in Economics (<https://cssh.northeastern.edu/economics/program/ms-graduate-program/>) website.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Quantitative		
ECON 5105 or ECON 6105	Math and Statistics for Economists Advanced Mathematics and Statistics for Economists	4
ECON 5140 or ECON 6140	Applied Econometrics Advanced Applied Econometrics	4
Theory		
ECON 5110 or ECON 6110	Microeconomic Theory Advanced Microeconomic Theory	4
ECON 5120 or ECON 6120	Macroeconomic Theory Advanced Macroeconomic Theory	4

The Department of Economics recommends that undergraduate PlusOne students enrolled in graduate courses notify the instructor that they are in the PlusOne program at the start of the semester.

Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of the Data Science for Economics concentration.

- Data Science for Economics (p. 1257)
- Electives Option (p. 1258)

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.		1–2
ECON 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

32 semester hours required (33–34 with optional co-op)

Minimum 3.000 GPA required

CONCENTRATION IN DATA SCIENCE FOR ECONOMICS

Code	Title	Hours
Required		
DS 5110 or CS 5200 or DAMG 6210 or IE 6700	Essentials of Data Science Database Management Systems Data Management and Database Design Data Management for Analytics	4
Complete one of the following (it is requested that students seek program approval prior to registering for CS 5800):		4
CS 5800 OR 6205	Algorithms Deterministic Operations Research	
Complete 4 semester hours from the following:		4
CS 7140 DS 5230 or CS 6220	Advanced Machine Learning Unsupervised Machine Learning and Data Mining Data Mining Techniques	
ECON 5210 or DS 5220 or CS 6140	Machine Learning in Economics Supervised Machine Learning and Learning Theory Machine Learning	
ECON 5220	Computational Finance and Financial Econometrics	
IE 6600	Computation and Visualization for Analytics	
IE 7275	Data Mining in Engineering	

Economics Elective

Complete 4 semester hours from the following range:	4
ECON 5200 to ECON 7772	

ELECTIVES OPTION

With prior approval from the graduate program director, the following courses may substitute for electives: Thesis (ECON 7990) or Internship In Economics (ECON 8550). Additionally, a student may select a maximum of 8 graduate semester hours offered by other departments.

Code	Title	Hours
Complete 16 semester hours from the following range (excluding any class taken to fulfill core requirements above):		16
ECON 5200 to ECON 7772		

Economics, MS (Seattle)

The Master of Science in Economics program focuses on applied economic policy analysis, with broad specialization areas. The program is large enough to support a full slate of core and area courses each year, yet small enough to maintain a sense of community among the students. The program is especially appropriate for those who wish to work in or return to positions in government, teaching, finance, or industry while providing a rigorous basis for those who want to continue their studies to the doctoral level.

The Master of Science in Economics offers the opportunity for master's students to apply for paid work positions through Northeastern University's world-famous co-op program. Qualified and approved master's students can participate in co-op as practicing economists for up to six months as part of their academic program (note that a minimum GPA of 3.000 is required in order to apply). This paid work experience enhances the degree and its emphasis on application. Students have an opportunity to learn how to apply their knowledge, solve problems, and make a difference in the world before they graduate. Our graduates either find full-time work in their area of specialty or go on to earn additional graduate degrees. All of our graduates have found jobs after completing our program. For more information, please visit the Master of Science in Economics (<https://cssh.northeastern.edu/economics/program/ms-graduate-program/>) website.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Quantitative		
ECON 5105	Math and Statistics for Economists	4
or ECON 6105	Advanced Mathematics and Statistics for Economists	
ECON 5140	Applied Econometrics	4
or ECON 6140	Advanced Applied Econometrics	
Theory		
ECON 5110	Microeconomic Theory	4
or ECON 6110	Advanced Microeconomic Theory	
ECON 5120	Macroeconomic Theory	4
or ECON 6120	Advanced Macroeconomic Theory	

Concentration in Data Science for Economics

Code	Title	Hours
CS 5200	Database Management Systems	4
or DAMG 6210	Data Management and Database Design	
or IE 6700	Data Management for Analytics	
OR 6205	Deterministic Operations Research	4
or CS 5800	Algorithms	
Complete 4 semester hours from the following courses:		4
CS 6966	Practicum	
CS 7140	Advanced Machine Learning	
DS 5220	Supervised Machine Learning and Learning Theory	
or CS 6140	Machine Learning	

DS 5230	Unsupervised Machine Learning and Data Mining
or CS 6220	Data Mining Techniques
IE 6600	Computation and Visualization for Analytics
IE 7275	Data Mining in Engineering

Electives

Code	Title	Hours
Complete 4 semester hours from the following:		4
Note: ECON 5200 is the primary elective offered on the Seattle campus. Consult program for current elective details.		
ECON 5200	Topics in Applied Economics	
ECON 5291	Applied Development	
ECON 5292	Gender and Development Economics	
ECON 7200	Topics in Applied Economics	
ECON 7250	International Economic Development	
ECON 7251	International Finance	
ECON 7266	Economics of Government	
ECON 7710	Microeconomic Theory 2	
ECON 7720	Macroeconomic Theory 2	
ECON 7740	Applied Econometrics 2	
ECON 7763	Labor Market Analysis	
ECON 7764	Topics in Labor Economics	
ECON 7771	Framework of Industrial Organization	
ECON 7772	Public Policy Toward Business	

Optional Co-op Experience

Code	Title	Hours
ECON 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

32 semester hours required

Minimum 3.000 GPA required

English

Website (<https://cssh.northeastern.edu/english/experiential-academics/majors-minors-grad-programs/#Graduate>)

Theo Davis, PhD

Professor and Chair

th.davis@northeastern.edu

617.373.3692

617.373.2509 (fax)

gradenglish@northeastern.edu

CSSH Graduate Programs General Regulations (p. 1239)

The graduate program in English is grounded in the study of British and American literature through the most current modes of humanistic inquiry and in the disciplines of writing and rhetoric. Both in coursework and through the NULab for Digital Humanities and Computational Social Sciences (<https://web.northeastern.edu/nulab/>), the graduate program in English also offers training in the digital humanities. Altogether, our degree programs provide a challenging, flexible, and wide-ranging education in English studies today.

Programs

Doctor of Philosophy (PhD)

- English (Boston) (p. 1260)

Master of Arts (MA)

- English (Boston) (p. 1262)

Graduate Certificate

- Digital Humanities (Boston) (p. 1263)

English, PhD (Boston)

The PhD program seeks to train students to be productive scholars and teachers in the fields of both literary studies and rhetoric and composition. In course work, students read and analyze the important texts, current issues, and critical methodologies of the discipline. Drawing on the breadth of this preparation, students demonstrate their ability to recognize and produce scholarly arguments in designing the three comprehensive field papers in areas of scholarly interest and competence corresponding to recognized and emerging fields of study. Finally, the dissertation offers students an opportunity to design a focused research project in consultation with a dissertation advisor. Throughout the program, faculty works closely with doctoral students to develop their scholarly and professional identities in preparation for careers.

Academic Standing/Progress

To be considered in good academic standing, PhD students must be making progress toward their degree requirements, including maintaining a 3.500 minimum cumulative grade-point average (GPA) and completing the comprehensive examination within one year of finishing coursework.

Doctoral Degree Candidacy

Students entering with a relevant BA must complete 48 semester hours; students entering with a relevant MA must complete 24 semester hours. All students must complete the language requirement, pass the comprehensive examination, and submit their approved prospectus within six months after completing the comprehensive examination to reach candidacy.

General Regulations

Program requirements are described in the CSSH Graduate Programs General Regulations (p. 1239) and the Graduate Program in English PhD Guide (<https://cssh.northeastern.edu/english/resources/resources-for-current-grad-students/>). Both documents are updated annually.

Program Requirements

Bachelor's Degree Entrance

Milestones

- Annual progress review
- Reading proficiency in two languages other than English
- Comprehensive exam
- Dissertation committee
- Dissertation prospectus
- Doctoral degree candidacy
- Public prospectus/dissertation work-in-progress presentation
- Dissertation defense

Core Requirements

Code	Title	Hours
Proseminar		
ENGL 5103	Proseminar	4
Theories and Methods		
Complete 4 semester hours from the following:		4
ENGL 7351	Topics in Literary Study	
ENGL 7358	Topics in Cultural and Interdisciplinary Studies	
ENGL 7370	Introduction to Digital Humanities	
ENGL 7380	Topics in Digital Humanities	
WMNS 6100	Theorizing Gender and Sexuality	
WMNS 7976	Directed Study (GCWS Consortium, selected topics only)	

Writing and Rhetoric

Complete 4 semester hours from the following (if completing 12 semester hours of Literary Period requirements).	4-8
Complete 8 semester hours of the following (if completing 8 hours of Literary Period requirements).	

ENGL 7360	Topics in Rhetoric
ENGL 7392	Writing and the Teaching of Writing
ENGL 7395	Topics in Writing

Literary Periods

Complete 8 semester hours from TWO of the following Literary Periods (if completing 8 semester hours of Writing and Rhetoric requirements), or complete 12 semester hours from THREE of the following Literary Periods (if completing 4 semester hours of Writing and Rhetoric requirements):

Literature Pre-1700

ENGL 7281	Topics in Medieval Literature
ENGL 7282	Topics in Renaissance Literature

Literature 1700–1900

ENGL 7284	Topics in 18th-Century Literature
ENGL 7352	Topics in Genre

Literature Post-1900

ENGL 7211	
ENGL 7244	

Electives

Code	Title	Hours
Complete 24 semester hours of ENGL courses, or non-ENGL courses through successful petition.		24

Dissertation

Code	Title	Hours

Exam Preparation

ENGL 8960	Exam Preparation—Doctoral (Only needed for PhD students who have completed coursework but have yet to complete the comprehensive exams. Repeatable.)

Research

ENGL 9986	Research (To be completed during the proposal/prospectus phase prior to reaching candidacy.)

Dissertation

ENGL 9990	Dissertation Term 1
ENGL 9991	Dissertation Term 2

Dissertation Continuation

Following completion of ENGL 9990 and ENGL 9991, registration in the following class is required in each fall and spring semester for all students and each summer semester for those within funding until the dissertation is completed (students outside of funding must also register in the summer semester if it is their terminal term):

ENGL 9996	Dissertation Continuation

Program Credit/GPA Requirements

48 total semester hours required
Minimum 3.500 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

- Annual progress review
- Reading proficiency in two languages other than English
- Comprehensive exam
- Dissertation committee
- Dissertation prospectus
- Doctoral degree candidacy
- Public prospectus/dissertation work-in-progress presentation
- Dissertation defense

Core Requirements

Code	Title	Hours
Proseminar		
ENGL 5103	Proseminar	4

Electives

Code	Title	Hours
Complete 20 semester hours of ENGL courses.		20

Dissertation

Code	Title	Hours
Exam Preparation		
ENGL 8960	Exam Preparation—Doctoral (Only needed for PhD students who have completed coursework but have yet to complete the comprehensive exams. Repeatable.)	

Research

ENGL 9986	Research (To be completed during the proposal/prospectus phase prior to reaching candidacy.)	

Dissertation

ENGL 9990	Dissertation Term 1	
ENGL 9991	Dissertation Term 2	

Dissertation Continuation

Following completion of ENGL 9990 and ENGL 9991, registration in the following class is required in each fall and spring semester for all students and each summer semester for those within funding until the dissertation is completed (students outside of funding must also register in the summer semester if it is their terminal term):

ENGL 9996	Dissertation Continuation	

Program Credit/GPA Requirements

24 total semester hours required
Minimum 3.500 GPA required

English, MA (Boston)

The Master of Arts degree launches students into the study of literature, writing, and rhetoric at the graduate level. The program offers one and a half to two years of intensive study in the major fields of British and American literature, covering the debates and approaches that animate the discipline of English. Our MA graduates are fully prepared to proceed to study at the doctoral level, and their training in critical thinking, language skills, and cultural history has also proven to be fruitful preparation for a range of careers outside of academia.

The master's program offers an optional cooperative education experience to eligible students. Co-op is central to both the Northeastern University experience and the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the co-curricular experiential integration course.

Academic Standing/Progress

To be considered in good academic standing, MA students must be making progress toward their degree requirements, including maintaining a 3.000 minimum cumulative grade-point average.

General Regulations

Program requirements are described in the CSSH Graduate Programs General Regulations (p. 1239) and the Graduate Program in English MA Guide (<https://cssh.northeastern.edu/english/resources/resources-for-current-grad-students/>). Both documents are updated annually.

Program Requirements**Milestones**

Annual progress review
Reading proficiency in a language other than English

Core Requirements

Code	Title	Hours
Proseminar		
ENGL 5103	Proseminar	4
Theories and Methods		
Complete 4 semester hours from the following:		4
ENGL 7351	Topics in Literary Study	
ENGL 7358	Topics in Cultural and Interdisciplinary Studies	
ENGL 7370	Introduction to Digital Humanities	
ENGL 7380	Topics in Digital Humanities	
WMNS 6100	Theorizing Gender and Sexuality	
WMNS 7976	Directed Study (GCWS Consortium, selected topics only)	
Writing and Rhetoric		
Complete 4 semester hours from the following (if completing 12 semester hours of literary period requirements); or complete 8 semester hours from the following (if completing 8 semester hours of literary period requirements):		4-8
ENGL 7360	Topics in Rhetoric	
ENGL 7392	Writing and the Teaching of Writing	
ENGL 7395	Topics in Writing	
Literary Periods		
Complete 8 semester hours from two of the following literary periods (if completing 8 semester hours of writing and rhetoric requirements); or complete 12 semester hours from three of the following literary periods (if completing 4 semester hours of writing and rhetoric requirements):		8-12
<i>Literature Pre-1700</i>		
ENGL 7281	Topics in Medieval Literature	
ENGL 7282	Topics in Renaissance Literature	
<i>Literature 1700–1900</i>		
ENGL 7284	Topics in 18th-Century Literature	
ENGL 7352	Topics in Genre	
<i>Literature Post-1900</i>		
ENGL 7351	Topics in Literary Study	

Electives

Code	Title	Hours
Complete 8 semester hours of ENGL courses, or non-ENGL courses with prior approval.		8
ENGL 5000-ENGL 7980		
ENGL 7990	Thesis (minimum 3.500 GPA required)	

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 SH for one term. Longer co-ops require registration at 1 SH per term for two consecutive terms		1-2
ENGL 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

32 total semester hours required (34 with optional co-op)
Minimum 3.000 GPA required

Digital Humanities, Graduate Certificate (Boston)

CSSH Graduate Programs General Regulations (p. 1239)

The Graduate Certificate in Digital Humanities allows students to pursue an organized course of study in digital humanities with the interdisciplinary faculty of the NULab for Texts, Maps, and Networks (<https://cssh.northeastern.edu/nulab/>). This certificate can be completed both by Northeastern University doctoral and master's students in the course of their existing program of study as well as those seeking a stand-alone certificate.

Digital humanities is an emerging field of research that is interdisciplinary in scope and collaborative in nature. The field is developing in relation to new digital technologies that have changed the objects of study, methods, and opportunities for research and teaching in existing humanities fields. Digitized texts are now read and accessed in new ways; digitized corpora of texts make possible new modes of quantitative and qualitative analysis (including “distant reading,” text mining, mapping, and network analysis); born digital objects constitute new primary sources in need of humanistic theorization, approaches, and critical vocabularies; and modes of encoding, aggregating, and connecting texts enable the creation of new archival resources that are changing our understanding of the archive itself as well as revealing new historical, literary, and cultural patterns.

The field is new and developing rapidly. Many students are eager for training in this area—both because DH is at the cutting edge of disciplinary work and because it offers new opportunities for employment within the academy and outside of it.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Final Project

The student will complete a final independent DH research project located in the student’s home program (such as a thesis, or a portion thereof) or participation in a collaborative DH project with substantial student participation. The final project will be overseen by the NULab faculty members teaching the NULab project seminar during its development; NULab workshop instructors will advise students on their projects and help students get guidance from other faculty as appropriate. Final projects will be submitted with three components: the project itself, a written project description of about 3,000 words, and a presentation to the NULab community. The DH certificate committee will formally approve all final projects.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Topics/Readings/Methods		
ENGL 7370	Introduction to Digital Humanities	4
or HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	

Lab Project Seminar

Complete the following (repeatable) course twice:		4
INSH 7910	NULab Project Seminar	

Elective

Code	Title	Hours
Complete 4 semester hours from the following:		4
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
ARTG 5150	Information Visualization Principles and Practices	
CS 6120	Natural Language Processing	
CS 7250	Information Visualization: Theory and Applications	
CS 7260	Visualization for Network Science	
CS 7290	Special Topics in Data Science	
ENGL 7358	Topics in Cultural and Interdisciplinary Studies (consult an advisor for applicable topics)	
ENGL 7380	Topics in Digital Humanities (consult an advisor for applicable topics)	
HIST 7239	Space and Place	
HIST 7250	Topics in Public History (consult an advisor for applicable topics)	
HIST 7251	Topics in American History (consult an advisor for applicable topics)	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 5602	Archives and Ethnography	
INSH 6406	Analyzing Complex Digitized Data	
JRNL 6340	Fundamentals of Digital Journalism	
JRNL 6341	Telling Your Story with Data	
JRNL 6355	Seminar in Investigative Reporting	

POLS 7334

Social Networks

PPUA 5263

Geographic Information Systems for Urban and Regional Policy

Program Credit/GPA Requirements

Minimum 12 total semester hours required

Minimum 3.000 GPA required

History

Website (<https://cssh.northeastern.edu/history/>)

Gretchen Heefner, PhD

Professor and Chair

617.373.2662

history.department@northeastern.edu (gradhistory@northeastern.edu)

CSSH Graduate Programs General Regulations (p. 1239)

Graduate work in history focuses on global and world history. Students at both the master's and doctoral levels concentrate on the intersections and connections between national, regional, and global developments. The Department of History also offers a master's degree with a concentration in public history that emphasizes the study of material culture, historical exhibits and museums, historical agencies, and archival administration. Recent doctoral students have been the recipients of major fellowships for conducting dissertation research abroad including Fulbright, Fulbright-Hays, Social Science Research Council, and Chateaubriand fellowships.

Programs

Doctor of Philosophy (PhD)

- History (Boston) (p. 1265)

Master of Arts (MA)

- History (Boston) (p. 1267)

Graduate Certificate

- Public History (Boston) (p. 1269)

History, PhD (Boston)

The PhD program, with a focus on global, transnational, and comparative history, seeks to train research historians who plan to teach at the college and university level. Systematic training in theory and methodology and preparation for college teaching are distinctive features of the Northeastern program.

Academic Standing/Progress

Students are required to maintain an overall GPA of at least 3.500. In addition, the PhD annual review is based on a report by the student's advisor with attention to:

1. Success in setting up a doctoral committee
2. Passing the departmental language examination in the language of their field
3. Successful performance of teaching assistant duties
4. Successful completion of courses in the tiered system (i.e., the required course sequence)
5. Successful completion, where appropriate, of other required activities, including construction of the comprehensive examination list and the dissertation proposal and scheduling of comprehensive examinations

Doctoral Degree Candidacy

Students entering without an MA in history must complete 45 semester hours of coursework; pass the qualifying examination; and successfully defend a dissertation proposal by the end of the third year in the program. Students entering with an MA in history must complete 29 semester hours of coursework; pass the qualifying examination; and successfully defend a dissertation proposal by the end of the third year in the program. Upon completion of these requirements, students will be deemed PhD degree candidates by the college.

Program Requirements

Milestones

Qualifying examination

Annual review

Language
PhD candidacy
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
Theory and Methodology		
A grade of B or higher is required:		
HIST 5101	Theory and Methodology 1	4
HIST 5102	Theory and Methodology 2	4
Digital History		
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	4
Topics, Directed Study, or Readings		
Complete 20 semester hours in Topics, Directed Study, or Readings:		20
HIST 7219-7251 Topics		
HIST 7976	Directed Study	
HIST 8982	Readings	
Research Seminar		
HIST 7314	Research Seminar in World History	4
Practicum		
HIST 8409	Practicum in Teaching	1

Electives

Code	Title	Hours
Complete 8 semester hours from the following range:		8
HIST 7200 to HIST 7702		

Dissertation

Code	Title	Hours
Exam Preparation		
Only needed for PhD students who have completed all coursework but have not yet passed the comprehensive exam:		
HIST 8960	Exam Preparation—Doctoral	
Dissertation		
HIST 9990	Dissertation Term 1	
HIST 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of two semesters of HIST 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:		
HIST 9996	Dissertation Continuation	

Program Credit/GPA Requirements

45 total semester hours required
Minimum 3.500 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Qualifying examination
Annual review
Language
PhD candidacy
Dissertation committee
Dissertation proposal
Dissertation defense

Core Requirements

Code	Title	Hours
Theory and Methodology		
A grade of B or higher is required:		
HIST 5102	Theory and Methodology 2	4
Digital History		
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History ¹	4
Readings or Directed Study		
Complete 8 semester hours from the following:		8
HIST 8982	Readings	
or HIST 7976	Directed Study	
Research Seminar		
HIST 7314	Research Seminar in World History	4
Practicum		
HIST 8409	Practicum in Teaching ¹	1

¹ Students who have completed courses assessed as equivalent to Texts, Maps, and Networks: Readings and Methods for Digital History (HIST 7370) or Practicum in Teaching (HIST 8409) may apply to the program director to substitute other Northeastern courses for these requirements.

Electives

Code	Title	Hours
Complete 8 semester hours from the following range:		8
HIST 7200 to HIST 7702		

Dissertation

Code	Title	Hours
Exam Preparation		
Only needed for PhD students who have completed all coursework but have yet to pass the comprehensive exam. Not repeatable.		
HIST 8960	Exam Preparation—Doctoral	
Dissertation		
HIST 9990	Dissertation Term 1	
HIST 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of two semesters of HIST 9990, registration in the following is required in each semester (excluding summers) until the dissertation is completed:		
HIST 9996	Dissertation Continuation	

Program Credit/GPA Requirements

29 total semester hours required

Minimum 3.500 GPA required

History, MA (Boston)

CSSH Graduate Programs General Regulations (p. 1239)

The Master of Arts in History offers two concentrations: public history and world history.

Public history encompasses the practice of history outside the academy in museums, state and local historical societies, archives, the National Park Service, and more. Public history includes the study of such topics as material culture, historical exhibits and museums, historical agencies, archival administration, and how difficult issues including slavery and site of violence are presented to the public.

World history focuses on the history of regions or peoples in Africa, Europe, Latin America, Asia, or the United States, with attention to the intersections and connections between national, regional, and global developments.

The master's program offers an optional cooperative education experience ("co-op") to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences as practicing public historians. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Academic Standing/Progress

Students are expected to maintain a 3.000 grade-point average (GPA). Should the GPA drop below 3.000, the student will be placed on academic probation and allowed one more semester to bring their GPA to the 3.000 level. If the student is not able to meet this requirement by the end of the following semester, the student may be asked to leave the program.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

The Master of Arts in History offers two concentrations: world history (p. 1269) and public history (p. 1268). The program requires a concentration. Please consult with a Department of History graduate program director for additional details.

Core Requirements

Code	Title	Hours
Theory and Methodology		
A grade of B or higher is required.		
HIST 5101	Theory and Methodology 1	4

Concentration Options

Complete one of the following concentrations:

- Public History (p. 1268)
- World History (p. 1269)

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration. Each of the following courses must be taken twice.		2
HIST 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

32 total semester hours required.

The Concentration in Public History requires 36 semester hours.

(2 additional semester hours required for participation in optional co-op)

Minimum 3.000 GPA required

PUBLIC HISTORY CONCENTRATION

Code	Title	Hours
Public History		
HIST 5237	Issues and Methods in Public History	4
Digital History		
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	4
Fieldwork		
HIST 8410	Fieldwork in History 1 (2 semester hours course to be taken twice)	4
HIST 8411	Fieldwork in History 2	4
Research Seminar		
Complete 4 semester hours from either of the following course number ranges:		4
HIST 6000 to HIST 6900		
HIST 7301 to HIST 7325		

Electives

Complete 12 semester hours from any of the following ranges:

12

HIST 6238 to HIST 6248

HIST 6295 to HIST 6966

HIST 7201 to HIST 7297

WORLD HISTORY CONCENTRATION**Milestone**

Students who declare this concentration must demonstrate a reading knowledge in a language other than English.

Code	Title	Hours
Methods		
A grade of B or higher is required.		
HIST 5102	Theory and Methodology 2	4
Research Seminar		
Complete 4 semester hours from the following course number range:		4
HIST 7301 to HIST 7325		
Electives		
Complete 20 semester hours from any of the following ranges:		20
HIST 6103 to HIST 6295		
HIST 7205 to HIST 7218		
HIST 7220 to HIST 7297		

Public History, Graduate Certificate (Boston)

The Graduate Certificate in Public History allows students to pursue an organized course of study in public history. Students have an opportunity to gain a knowledge of core methods and issues in the field of public history and are enabled to use public history approaches in their own research and work.

Public history is a well-established field of practice that marries academic research and methods to public applications and collaborations. Public historians typically work in museums, archives, historical societies, documentary film production, and social activism, though training in public history is useful to a wide variety of humanistic, social science, and legal fields.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Issues and Methods		
HIST 5237	Issues and Methods in Public History	4
Fieldwork		
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1	

Elective

Code	Title	Hours
Complete one of the following:		4
HIST 5241	Exhibits and Museums	
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)	
HIST 7250	Topics in Public History (Public History and Slavery)	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Political Science

Website (<https://cssh.northeastern.edu/polisci/>)

Department Chair, Program Directors, and Staff Members (<https://cssh.northeastern.edu/polisci/staff-and-department-leadership/>)

Graduate training in political science prepares students to analyze important issues in world affairs and succeed in a wide array of careers—from government and academia to the nonprofit and private sectors. Graduate programs in political science, public policy, public administration, security and resilience studies, and international affairs at Northeastern University explore the theory and practice of politics, public policy, and public management in the United States and throughout the world. In teaching and research, faculty members in the department cover a broad range of topics and issues in the field of political science. Core areas of inquiry within our department include national and international security, international and U.S. public policy, resilience, network science, European studies, Middle East studies, and democratization and development.

Programs

Doctor of Philosophy (PhD)

- Political Science (Boston) (p. 1270)

Master of Arts (MA)

- Political Science (Boston) (p. 1272)

Master of Science (MS)

- Resilience Studies (Boston) (p. 1275)

Graduate Certificate

- Resilience Studies (Boston) (p. 1276)

Political Science, PhD (Boston)

The Doctor of Philosophy in Political Science is grounded in the core fields of the discipline—American government and politics, comparative politics, international relations, and public policy. Students identify a primary and secondary field as areas of emphasis. The curriculum introduces students to the core fields and also seeks to develop their research skills through a series of methods courses. Students may develop a traditional, academic focus in one of the fields, or they may combine it with public policy to highlight a policy orientation. The program focuses on preparing students to be academic scholars and teachers as well as practitioners in research and public service. The PhD degree includes completion of required courses, passing a written and oral comprehensive examination, and the successful defense of the dissertation before a faculty committee.

Credit Requirements and Advanced Standing

Students entering with a bachelor's degree must complete 56 semester hours. Students currently in the MA or MPA program and accepted into the PhD program before completing the MA or MPA must complete 56 semester hours as well as all curriculum requirements of the PhD program.

Students entering with a master's degree may receive advanced standing for relevant prior coursework but must complete a minimum of 40 semester hours. Students entering with a Northeastern MA in political science or international affairs must complete a minimum of 24 semester hours while also satisfying all PhD course requirements. Master's-level coursework that results in advanced standing is evaluated by the graduate program director to determine its applicability to the PhD curriculum.

Doctoral Degree Candidacy

Doctoral degree candidacy is attained after successfully completing all coursework, comprehensive examination, and the dissertation proposal defense.

Academic Standing/Progress

All doctoral students must maintain an overall cumulative grade-point average (GPA) of 3.500 while making progress toward the degree requirements. Students who fall below any applicable standard for two consecutive semesters are subject to dismissal from the graduate program. Additionally, receipt of financial support administered by the department, college, or university is contingent on satisfactory academic progress toward the degree and specific guidelines as published in the terms of award. Students who have ungraded courses or courses graded as incomplete risk no longer being eligible for financial aid awards.

Language Proficiency

Students who conduct research in a language other than English must demonstrate proficiency as necessary for completion of the dissertation. Language courses do not count as electives.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Comprehensive examination
Dissertation committee

Dissertation proposal
 Dissertation proposal oral defense
 Language (as determined by committee)
 PhD candidacy
 Dissertation defense

Core Requirements

Code	Title	Hours
Seminars		
Complete 12 semester hours from the following (complete both field seminars in the two areas in which you wish to take the comprehensive exams):		12
POLS 7204	Seminar in Public Policy	
POLS 7205	Seminar in American Government and Politics	
POLS 7206	Seminar in Comparative Politics	
POLS 7207	Seminar in International Relations	
Inquiry and Design		
INSH 6300	Research Methods in the Social Sciences	4
Quantitative Techniques		
INSH 6500	Statistical Analysis	4
INSH 7400	Quantitative Analysis	4
Advanced methods courses from other disciplines may be chosen in consultation with your faculty advisor.		

Electives

Courses from other disciplines may be chosen in consultation with your faculty advisor.

Code	Title	Hours
Complete 32 semester hours in the following:		32
POLS 7200 to POLS 7990		

Dissertation

Code	Title	Hours
Exam Preparation		
POLS 8960	Exam Preparation—Doctoral (Only required for PhD students who have completed coursework but have yet to complete the comprehensive exam. Required for students who must maintain full-time status while completing thesis or comprehensive exam.)	
Research		
POLS 9986	Research (To be completed during the proposal/prospectus phase prior to reaching candidacy.)	
Dissertation		
POLS 9990	Dissertation Term 1	
POLS 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of POLS 9990 and POLS 9991, registration in the following class is required in each semester (including the summer if the dissertation is submitted in the summer) until the dissertation is completed:		
POLS 9996	Dissertation Continuation	

Program Credit/GPA Requirements

56 total semester hours required
 Minimum 3.500 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below.

Milestones

Annual review
 Comprehensive examination
 Dissertation committee
 Dissertation proposal

Dissertation proposal oral defense
 Language (as determined by committee)
 PhD candidacy
 Dissertation defense

Core Requirements

Consult the graduate program director regarding which major-required courses apply to your individual plan of study.

Code	Title	Hours
Seminar		
Complete 12 semester hours from the following: ¹		12
POLS 7204	Seminar in Public Policy	
POLS 7205	Seminar in American Government and Politics	
POLS 7206	Seminar in Comparative Politics	
POLS 7207	Seminar in International Relations	
Inquiry and Design		
INSH 6300	Research Methods in the Social Sciences	4
Quantitative Techniques		
INSH 6500	Statistical Analysis	4
or INSH 7400	Quantitative Analysis	
INSH 7500	Advanced Quantitative Analysis	4
Advanced methods courses from other disciplines may be chosen in consultation with your faculty adviser.		

Electives

Code	Title	Hours
Complete 0-16 semester hours in the following. Courses from other disciplines may be chosen in consultation with your faculty adviser.		0-16
POLS 7200 to POLS 7990		

Dissertation

Code	Title	Hours
Exam Preparation		
POLS 8960	Exam Preparation—Doctoral (Only required for PhD students who have completed coursework but have yet to complete the comprehensive exam.)	0
Research		
POLS 9986	Research (To be completed during the proposal/prospectus phase prior to reaching candidacy.)	0
Dissertation		
POLS 9990	Dissertation Term 1	
POLS 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of POLS 9990 and POLS 9991, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
POLS 9996	Dissertation Continuation	

Program Credit/GPA Requirements

24-40 total semester hours required
 Minimum 3.500 GPA required

¹ You must complete both field seminars in the two areas you wish to take the comprehensive exams in.

gradpolisci@northeastern.edu

CSSH Graduate Programs General Regulations (p. 1239)

The Master of Arts program focuses on the core scholarly areas of political science. Students specialize in one of five concentration areas: American government and politics, comparative politics, international relations, public policy, and security studies. Courses in the MA program serve as a foundation for work in a doctoral program or as preparation for careers in government, nonprofit organizations, or related work in the private sector.

To earn the Master of Arts in Political Science degree at Northeastern University, you must successfully complete 32 semester hours (typically eight courses) of credit. Full-time students can expect to complete the degree within two academic years. Coursework consists of 4 semester hours in a required statistics course, 12 semester hours within a chosen concentration, and 16 semester hours of electives (including the experiential education requirement). To see the full breakdown, click the Program Requirements tab above.

Academic Standing/Progress

Satisfactory progress in the MA program includes maintaining a grade-point average of 3.000 overall as well as in the student's concentration area. A final cumulative GPA of at least 3.000 in all coursework is required to qualify for the Master of Arts degree. Any course in which a student earns lower than a C grade cannot be used to fulfill concentration area requirements. A student who fails to make satisfactory progress is placed on academic probation, which is a warning that the student may not be allowed to continue in the graduate program unless the deficiency is addressed.

Experiential Learning Requirement

In addition to in-class coursework, students are required to complete an experiential education component that advances their learning, research, and/or career objectives. Experiential education offers MA students a direct experience with focused reflection relevant to their academic studies. For students with research interests, the experience focuses on related activities, such as primary source analysis and data gathering. For other students, the experience involves engagement with areas of practice and policy, such as an internship. Students register for the relevant course with a minimum of 4 semester hours and maximum of 8 semester hours to satisfy the experiential education requirement.

An optional cooperative education experience can also satisfy the experiential education requirement. Co-op education is central to both the Northeastern experience and to the College of Social Sciences and Humanities Experiential Liberal Arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirement

Code	Title	Hours
Methods Course		
Complete 4 semester hours from the following:		4
CS 6220	Data Mining Techniques	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

Concentrations

- American Government and Politics (p. 1274)
- Comparative Politics (p. 1274)
- International Relations (p. 1274)
- Public Policy (p. 1275)
- Security Studies (p. 1275)

Electives

Code	Title	Hours
Complete 12 semester hours in the following range:		12
POLS 5408 to POLS 7976		

Experiential Learning Component

Code	Title	Hours
Complete 4 semester hours from the following:		4
POLS 7976	Directed Study	

POLS 7980	Capstone Project
POLS 7990	Thesis
POLS 8407	Internship

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.		1–2
POLS 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

32 total semester hours required (33–34 with optional co-op)
Minimum 3.000 GPA required

AMERICAN GOVERNMENT AND POLITICS CONCENTRATION

Code	Title	Hours
Seminar		
POLS 7205	Seminar in American Government and Politics	4
American Government Courses		
Complete 8 semester hours from the following:		8
POLS 7341	Security and Resilience Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5240	Health Policy and Politics	
PPUA 5245	Education Policy in the United States	
PPUA 5270	Food Systems and Public Policy	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6522	Administrative Ethics and Public Management	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	

COMPARATIVE POLITICS CONCENTRATION

Code	Title	Hours
Seminar		
POLS 7206	Seminar in Comparative Politics	4
Comparative Politics Courses		
Complete 8 semester hours from the following:		8
POLS 7325	Contemporary Issues in Third World Development	
POLS 7346 or PPUA 7346	Resilient Cities	
POLS 7366	Genocide in a Comparative Perspective	
PPUA 5240	Health Policy and Politics	
PPUA 5266	Urban Theory and Science	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	

INTERNATIONAL RELATIONS CONCENTRATION

Code	Title	Hours
Seminar		
POLS 7207	Seminar in International Relations	4
International Relations Courses		
Complete 8 semester hours from the following:		8

POLS 7341	Security and Resilience Policy
POLS 7343	Counterterrorism
POLS 7387	Global Governance

PUBLIC POLICY CONCENTRATION

Code	Title	Hours
Seminar		
POLS 7204	Seminar in Public Policy	4
or PPUA 6506	Techniques of Policy Analysis	

Public Policy Courses

Complete 8 semester hours from the following:		8
POLS 7341	Security and Resilience Policy	
PPUA 5240	Health Policy and Politics	
PPUA 5245	Education Policy in the United States	
PPUA 6500	Principles of Public Administration	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6507	Institutional Leadership and the Public Manager	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	

SECURITY STUDIES CONCENTRATION

Code	Title	Hours
Security Studies Courses		
POLS 7341	Security and Resilience Policy	4
Complete 8 semester hours from the following:		8
POLS 7207	Seminar in International Relations	
POLS 7343 to POLS 7346		
POLS 7366	Genocide in a Comparative Perspective	
POLS 7387	Global Governance	

Resilience Studies, MS (Boston)

Resilience studies is an emerging field of inquiry that focuses on how global, national, and subnational actors manage a range of chronic transnational challenges—such as terrorism, organized crime, weapons proliferation, cyberattacks, bioterrorism, climate change and catastrophic disasters, migration, and radicalization—that can be destabilizing to societies. It explores how strategic doctrines, organization processes, bureaucratic behaviors, and security tools and tactics are adapting to these challenges by placing greater emphasis on resilience. Resilience is a concept rooted in multiple disciplines that is gaining widespread currency at the community, societal, and global levels given the prevalence of human-made and naturally occurring threats that do not lend themselves to preventive and protective measures. Strategies for dealing with these threats emphasize measures that mitigate, respond to, recover from, and adapt to risk in order to safeguard essential functions and societal values. Many of these measures involve the role of technologies, system design, and engineering as well as policy, regulatory, and governance issues. Students at Northeastern University who enroll in the Master of Science in Resilience Studies have an opportunity to become prepared to inform and support domestic and international efforts to deal with the major sources of turbulence in the 21st century.

The master's program offers an optional cooperative education experience to eligible students. Co-op is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

To earn the Master of Science in Resilience Studies degree at Northeastern, you must successfully complete 32 semester hours (or 33–34 semester hours with co-op). Full-time students can expect to complete the degree within one calendar year. Cost per semester hour may vary based on the college that offers the course. See Tuition and Fees (p. 72) for more information.

Academic Standing/Progress

Satisfactory progress in the MS program includes maintaining a minimum grade-point average of 3.000.

Program Requirements**Core Requirements**

Code	Title	Hours
Required Courses		
POLS 7341	Security and Resilience Policy ¹	4
POLS 7346 or PPUA 7346	Resilient Cities Resilient Cities	4
Research Methods		
Complete one of the following:		4
CRIM 5270	Crime Mapping	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

Electives

Code	Title	Hours
Complete 16 semester hours from any combination of the following:		16
POLS 7343	Counterterrorism	
PPUA 5100	Climate and Development	
PPUA 5235	Participatory Community Planning Methods	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5267	Climate Policy and Justice	
PPUA 5390	Special Topics in Public Policy and Urban Affairs	
PPUA 6503	Managing People in Public and Nonprofit Sectors	
PPUA 6532	Building Resilience into Local Government	
SCHM 6201	Operations and Supply Chain Management	

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.		1-2
POLS 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

32 total semester hours (33–34 with optional co-op) required

Minimum 3.000 GPA required

¹ Occasional online offering

Resilience Studies, Graduate Certificate (Boston)

The goal of the Graduate Certificate in Resilience Studies is to prepare students to manage contemporary transnational risks by offering them an opportunity to gain a comprehensive understanding of the principles and policies for security and resilience of critical systems. This goal is achieved by:

- Passing a core course in security and resilience policy that introduces students to a comprehensive approach to managing transnational risks
- Passing recommended foundation courses for cyberspace policy, security administration, and counterterrorism specializations that provide a broad perspective on transnational threats and the means states use to address them
- Learning how to work with others in groups and exercise leadership in teams by completing group assignments and projects

The certificate requires students to take three courses for a total of 12 semester hours. This program can be completed at Northeastern University's Boston campus or online.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirement

Code	Title	Hours
POLS 7341	Security and Resilience Policy	4

Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8
CRIM 6200	Criminology	
POLS 5408	International Security	
POLS 7343	Counterterrorism	
POLS 7346	Resilient Cities	
PPUA 5390	Special Topics in Public Policy and Urban Affairs	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

School of Public Policy and Urban Affairs

Website (<https://cssh.northeastern.edu/policyschool/>)

Maria Ivanova, PhD

Director, School of Public Policy and Urban Affairs

m.ivanova@northeastern.edu

310 Renaissance Park

617.373.8900

617.373.7905 (fax)

policyschool@northeastern.edu

The School of Public Policy and Urban Affairs is nationally and internationally recognized for excellence and innovation in policy-oriented education, applied research, and engagement. Our mission is to educate professional master's and doctoral students who are sought after as policy analysts, program evaluators, and leaders of nonprofit, public, private sector, and academic institutions; to create and disseminate policy-relevant knowledge and analytical methods of value to policymakers and the public; and to serve the broader community through policy analysis and technical assistance.

The school is committed to excellence in research and education on pressing and emerging policy issues of the day—public health, climate change, environmental challenges, the court and justice systems, and creating sustainable and resilient cities that provide economic opportunity for their residents. We define our approach as locally informed and internationally relevant. Our hallmark is to engage students in building the world that they would like to live in through experiential learning opportunities and applied research.

Programs

Doctor of Philosophy (PhD)

- Public Policy (Boston) (p. 1278)

Master of Arts (MA)

- International Affairs (Boston) (p. 1283)

Master of Public Administration (MPA)

- Public Administration (Boston) (p. 1286)
- Public Administration (Arlington) (p. 1285)
- Public Administration (Oakland) (p. 1287)

Master of Public Policy (MPP)

- Public Policy (Boston) (p. 1290)
- Public Policy (Arlington) (p. 1289)
- Public Policy (Oakland) (p. 1292)

Master of Science (MS)

- Engineering and Public Policy (Boston) (p. 523)
- Environmental Science and Policy (Boston) (p. 1174)
- Urban Informatics (Boston) (p. 1299)
- Urban Informatics (Arlington) (p. 1298)
- Urban Planning and Policy (Boston) (p. 254)

Dual Degree

- Law, JD/Public Policy, MPP (Boston) (p. 984)

Graduate Certificates

- Nonprofit Sector, Philanthropy, and Social Change (Boston) (p. 1307)
- Nonprofit Sector, Philanthropy, and Social Change (Arlington) (p. 1307)
- Public Policy Analysis (Boston) (p. 1309)
- Public Policy Analysis (Arlington) (p. 1308)
- Sustainability and Climate Change Policy (Boston) (p. 1310)
- Urban Analytics (Boston)
- Urban Studies (Boston) (p. 1311)

Public Policy, PhD (Boston)

Website (<https://cssh.northeastern.edu/policyschool/>)

CSSH Graduate Programs General Regulations (p. 1239)

The PhD in Public Policy is an interdisciplinary program that combines social science and legal theoretical perspectives with quantitative and qualitative research methodologies. The faculty in the School of Public Policy and Urban Affairs support students’ research and dissertations in three broad areas of inquiry—urban and regional policy, sustainability and resilience, and health management and policy. Students work with faculty advisors to formulate a plan of study within their field of concentration by choosing from graduate programs offered in the School of Public Policy and Urban Affairs, the College of Social Sciences and Humanities, and in other colleges and schools at Northeastern University. Students study a common body of knowledge in core courses in policy theory, research methods, and statistics, followed by courses in each student’s respective concentration. The school’s research centers and faculty research projects provide opportunities for students to develop insight, experience, and synergies to help with their own research goals. The college and school offer a high level of support allowing all students to be devoted full time to their studies and research. The program is full time and in residence only.

Doctoral Degree Candidacy

Complete all required coursework with a minimum 3.500 grade-point average, pass the comprehensive examinations, and defend a dissertation proposal. Students entering without a JD or master’s degree must complete 55 semester hours. Students entering with a JD or master’s degree must complete 47 semester hours.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

- Annual review
- Comprehensive examination
- Dissertation committee
- Dissertation proposal
- PhD candidacy
- Dissertation defense

Core Requirements

A grade of B+ or higher is required in each course.

Code	Title	Hours
Seminar		
PPUA 7204	Seminar on Policy Theory	4
Complete the following two courses for a minimum of 4 semester hours total:		4
PPUA 7976	Directed Study	
PPUA 9984	Research	

Research and Statistical Methods

INSH 6300	Research Methods in the Social Sciences	4
INSH 6302	Qualitative Methods	4
INSH 7400	Quantitative Analysis	4

Advanced Methods

Complete one of the following (an additional concentration elective may be taken in lieu of the advanced methods elective): 4

INSH 7500	Advanced Quantitative Analysis
or INSH 7600	Multilevel Theorizing and Analysis

Experiential Research Residency

A PhD research residency or waiver is required.

Code	Title	Hours
PPUA 9980	Experiential PhD Research Residency	0

Concentrations

Complete one of the following concentrations:

- Health Policy and Management (p. 1279)
- Sustainability and Resilience (p. 1280)
- Urban and Regional Policy (p. 1280)

Exam and Dissertation

Code	Title	Hours

Exam Prep

Only needed for PhD students who have completed all coursework but have not yet passed the comprehensive exam/proposal defense. Repeatable:

PPUA 8960	Exam Preparation—Doctoral

Dissertation

PPUA 9990	Dissertation Term 1
PPUA 9991	Dissertation Term 2

Dissertation Continuation

Following completion of two semesters of dissertation (PPUA 9990 and PPUA 9991), registration in the following class is required in each semester (including summer if the dissertation is submitted in summer) until the dissertation is completed:

PPUA 9996	Dissertation Continuation

Program Credit/GPA Requirements

55 total semester hours required

Minimum 3.500 GPA required

HEALTH POLICY AND MANAGEMENT CONCENTRATION

Code	Title	Hours

Seminar

PPUA 5220	How Healthcare Works: Business and Policy Innovations	4

Health Organization

HRMG 6220	Health Organization Management	3

Business Elective

Complete 3 semester hours from the following: 3

FINA 6220	Healthcare Finance
SCHM 6223	Managing Healthcare Supply Chain Operations
STRT 6220	Strategic Management for Healthcare Organizations

Law Requirement

LW 7335	Health Law	3

Electives

Complete a minimum of 18 semester hours from the following: 18

ECON 7200	Topics in Applied Economics
LPSC 7311	Strategizing Public Policy
PPUA 5240	Health Policy and Politics
PPUA 6509	Techniques of Program Evaluation
SOCL 7267	Environment, Health, and Society
PHTH 6000–9999 (public health elective, by advisement)	

SUSTAINABILITY AND RESILIENCE CONCENTRATION

Code	Title	Hours
Seminar		
PPUA 6101	Environmental Science and Policy Seminar 1	4
Law Requirement		
LW 7329	Environmental Law	3
Electives		
Complete 24 semester hours from the following:		24
CIVE 7110	Critical Infrastructure Resilience	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
POLS 7341	Security and Resilience Policy	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7346	Resilient Cities	
PPUA 7976	Directed Study	
SOCL 7267	Environment, Health, and Society	

URBAN AND REGIONAL POLICY CONCENTRATION

Code	Title	Hours
Seminar		
PPUA 7521	Seminar in Urban Theory	4
Law Requirement		
Consult an advisor when selecting courses from the following:		3
LW 6000–9999		
Electives		
Complete 24 semester hours from the following:		24
ARCH 5210	Environmental Systems	
ECON 7250	International Economic Development	
ECON 7266	Economics of Government	
ECON 7740	Applied Econometrics 2	
ECON 7763	Labor Market Analysis	
LPSC 7311	Strategizing Public Policy	
POLS 7325	Contemporary Issues in Third World Development	
POLS 7334	Social Networks	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7976	Directed Study	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7227	Race and Ethnic Relations	

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review
Comprehensive examination
Dissertation committee

Dissertation proposal
PhD candidacy
Dissertation defense

Core Requirements

A grade of B+ or higher is required in each course.

Code	Title	Hours
Seminar		
PPUA 7204	Seminar on Policy Theory	4
Complete the following two courses for a minimum of 4 semester hours total:		4
PPUA 7976	Directed Study	
PPUA 9984	Research	
Research and Statistical Methods		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6302	Qualitative Methods	4
INSH 7400	Quantitative Analysis	4
Advanced Methods		
Complete one of the following (an additional concentration elective may be taken in lieu of the advanced methods elective):		4
INSH 7500 or INSH 7600	Advanced Quantitative Analysis Multilevel Theorizing and Analysis	

Experiential Research Residency

A PhD research residency or waiver is required.

Code	Title	Hours
PPUA 9980	Experiential PhD Research Residency	0

Concentrations

Complete one of the following concentrations:

- Health Policy and Management (p. 1279)
- Sustainability and Resilience (p. 1280)
- Urban and Regional Policy (p. 1280)

Exam and Dissertation

Code	Title	Hours
Exam Prep		
Only required for students who have completed PhD coursework but have yet to complete the comprehensive exam/proposal defense. Repeatable:		
PPUA 8960	Exam Preparation—Doctoral	
Dissertation		
PPUA 9990	Dissertation Term 1	
PPUA 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of PPUA 9990 and PPUA 9991, registration in the following class is required in each semester (including summer if the dissertation is submitted in summer) until the dissertation is completed:		
PPUA 9996	Dissertation Continuation	

Program Credit/GPA Requirements

47 total semester hours required
Minimum 3.500 GPA required

HEALTH POLICY AND MANAGEMENT CONCENTRATION

Code	Title	Hours
Seminar		
PPUA 5220	How Healthcare Works: Business and Policy Innovations	4

Health Organization

HRMG 6220	Health Organization Management	3

Business Elective

Complete 3 semester hours from the following:	3

FINA 6220	Healthcare Finance	
SCHM 6223	Managing Healthcare Supply Chain Operations	
STRT 6220	Strategic Management for Healthcare Organizations	

Law Requirement

LW 7335	Health Law	3

Electives

Complete a minimum of 10 semester hours from the following:	10

ECON 7200	Topics in Applied Economics	
LPSC 7311	Strategizing Public Policy	
PPUA 5240	Health Policy and Politics	
PPUA 6509	Techniques of Program Evaluation	
SOCL 7267	Environment, Health, and Society	
PHTH 6000 to PHTH 9999 (public health elective, by advisement)		

SUSTAINABILITY AND RESILIENCE CONCENTRATION

Code	Title	Hours
Seminar		
PPUA 6101	Environmental Science and Policy Seminar 1	4
Law Requirement		
LW 7329	Environmental Law	3
Electives		
Complete 16 semester hours from the following:	16	
CIVE 7110	Critical Infrastructure Resilience	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
POLS 7341	Security and Resilience Policy	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7346	Resilient Cities	
PPUA 7976	Directed Study	
SOCL 7267	Environment, Health, and Society	

URBAN AND REGIONAL POLICY CONCENTRATION

Code	Title	Hours
Seminar		
PPUA 7521	Seminar in Urban Theory	4
Law Requirement		
Consult an advisor when selecting courses from the following:	3	
LW 6000 to LW 9999		
Electives		
Complete 16 semester hours from the following:	16	
ARCH 5210	Environmental Systems	
ECON 7250	International Economic Development	
ECON 7266	Economics of Government	
ECON 7740	Applied Econometrics 2	
ECON 7763	Labor Market Analysis	
LPSC 7311	Strategizing Public Policy	
POLS 7325	Contemporary Issues in Third World Development	
POLS 7334	Social Networks	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6509	Techniques of Program Evaluation	

PPUA 7237	Advanced Spatial Analysis of Urban Systems
PPUA 7976	Directed Study
SOCL 7221	Globalization, Development, and Social Justice
SOCL 7227	Race and Ethnic Relations

International Affairs, MA (Boston)

School of Public Policy and Urban Affairs (<https://cssh.northeastern.edu/policyschool/>)

We live in an increasingly interconnected global environment where people, goods, ideas, and conflicts traverse borders with rising frequency. Leaders in the activist, policy, and academic spheres must learn not only how to critically analyze these phenomena but also to envisage harnessing their constructive potential. The Master of Arts in International Affairs is an interdisciplinary graduate program dedicated to preparing tomorrow's global citizens.

A holistic approach to enhancing our understanding of the world must span the limits of any one academic field and embrace cross-disciplinary analytical competencies. Spanning several social sciences and humanities, our courses are taught by leading scholars who research democratization, gender, globalization, ethnic conflict and cooperation, human rights and international law, international relations, social activism, social justice, and many other topics. Through its core courses, its two thematic emphases—globalization, development, and social justice and international public policy—as well as global, policy, and methodological electives, this graduate program allows students to pursue a variety of themes.

The master's program offers an optional cooperative education experience ("co-op") to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Please review the tuition and fee (p. 72) page as credit costs differ depending on the College in which the course is located.

Sustainability and Climate Change Policy Concentration

This graduate concentration is available to students in the Master of International Affairs (MIAF) program in the College of Social Sciences and Humanities. It is designed to enable MIAF students to develop deeper insights into the policy dimensions of these intertwined but conceptually distinct realms of inquiry and action, and in both domestic and international domains. The concentration is comprised of three courses.

CSSH Graduate Programs General Regulations (p. 1239)

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Political Economy		
Complete 8 semester hours from the following:		8
POLS 7387	Global Governance	
PPUA 5268	International Environmental Policy	
SOCL 7221	Globalization, Development, and Social Justice	
Social Science Methods		
Complete 4 semester hours from the following:		4
ECON 5110	Microeconomic Theory	
ECON 5120	Macroeconomic Theory	
ECON 7251	International Finance	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
INSH 6302	Qualitative Methods	
Public Policy		

Complete 4 semester hours from the following:

4

PPUA 6502	Economic Analysis for Policy and Planning
PPUA 6506	Techniques of Policy Analysis
PPUA 6507	Institutional Leadership and the Public Manager
PPUA 6509	Techniques of Program Evaluation
PPUA 6551	Nonprofit Organizations and Social Change

Concentrations or Electives Option

A concentration is not required. Students may complete electives option in lieu of a concentration.

- Sustainability and Climate Change Policy (p. 1284)
- Electives (p. 1284)

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 SH for one term. Longer co-ops require registration at 1 SH per term for two consecutive terms.		1-2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

36 total semester hours required (37-38 with optional co-op)

Minimum 3.000 GPA required

SUSTAINABILITY AND CLIMATE CHANGE POLICY CONCENTRATION

Code	Title	Hours
Complete 12 semester hours from the following course list:		12
ENVR 6150	Food Security and Sustainability	
LPSC 7312	Cities, Sustainability, and Climate Change	
PPUA 5100	Climate and Development	
PPUA 5231	Transportation Policy	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	

Complete 8 semester hours of elective courses from the list below:

8

ELECTIVES OPTION

Selected in consultation with faculty advisor.

Code	Title	Hours
Complete 20 semester hours from the following list of courses:		20
INTL 7990	Thesis	
LPSC 5000 to LPSC 7999		
PPUA 5000 to PPUA 7999		
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
POLS 5000 to POLS 7999 (by advisement only)		
SOCL 5000 to SOCL 7999 (by advisement only)		

Public Administration, MPA (Arlington)

Website (<https://publicaffairs.northeastern.edu/master-of-public-administration/>)

CSSH Graduate Programs General Regulations (p. 1239)

The Master of Public Administration is the management and leadership degree for those seeking to serve the public good. The program seeks to equip its students with skills in policy analysis, program evaluation, research methods, and written and verbal communications.

Students have an opportunity to develop competencies in budgeting and human resources, organizational management and leadership, and the interplay between ethics and accountability in a diverse society.

Throughout the degree program, students gain career-oriented experience through internships, small group projects, and other interactions with professionals in the field. These experiences are designed to enable the Northeastern University MPA graduate to move into a wide array of public and nonprofit sector positions at the local, state, national, and international levels. The Northeastern MPA program is nationally accredited by NASPAA.

Mission Statement

The Master of Public Administration program at Northeastern University aspires to provide a platform where students, faculty, and community partners address contemporary challenges in public administration and governance. Recognizing the complexities of the fast-changing civic environment in the 21st century, we design adaptable academic and professional pathways.

Our pragmatic approach fosters an environment that invites participation from a diverse range of actors including scholars, nonprofit leaders, and policymakers. We emphasize experiential learning, inviting students to engage with real-world issues and collaboratively devise feasible solutions. We often view challenges through an urban-centered lens, and we embrace a global to local perspective.

Accountability and inclusivity lie at the heart of our program. We are committed to ethical governance and strive to create a space that values social equity and inclusion. We aim to develop innovators equipped with the skills and awareness to bring about transformative solutions that extend beyond geographic and disciplinary boundaries. By setting measurable objectives, we uphold these standards and continually assess and improve the impact of our initiatives.

Please review the tuition and fees (<https://studentfinance.northeastern.edu/billing-payments/tuition-and-fees/>) page as credit costs differ depending on the college that offers the course.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose cumulative GPA falls below 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative 3.000 grade-point average is required for the core requirements.

Code	Title	Hours
Quantitative Techniques		
INSH 6500	Statistical Analysis	4
Analysis		
PPUA 6502	Economic Analysis for Policy and Planning	4
PPUA 6506	Techniques of Policy Analysis	4
Administration and Management		
PPUA 6500	Principles of Public Administration	4
PPUA 6505	Public Budgeting and Financial Management	4
PPUA 6507	Institutional Leadership and the Public Manager	4
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

Internship Requirement

Code	Title	Hours
PPUA 6861	Internship	0

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms. Both of the following courses must be taken during each co-op semester.		1-2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
LPSC 5000 to LPSC 7999		
POLS 5000 to POLS 7999 (by advisement only)		
PPUA 5000 to PPUA 7999		
SOCL 5000 to SOCL 7999 (by advisement only)		

Program Credit/GPA Requirements

40 total semester hours required (41–42 with optional co-op)
Minimum 3.000 GPA

Public Administration, MPA (Boston)

Website (<https://publicaffairs.northeastern.edu/master-of-public-administration/>)

CSSH Graduate Programs General Regulations (p. 1239)

The Master of Public Administration is the management and leadership degree for those seeking to serve the public good. The program seeks to equip its students with skills in policy analysis, program evaluation, research methods, and written and verbal communications.

Students have an opportunity to develop competencies in budgeting and human resources, organizational management and leadership, and the interplay between ethics and accountability in a diverse society.

Throughout the degree program, students gain career-oriented experience through internships, small group projects, and other interactions with professionals in the field. These experiences are designed to enable the Northeastern University MPA graduate to move into a wide array of public and nonprofit sector positions at the local, state, national, and international levels. The Northeastern MPA program is nationally accredited by NASPAA.

Mission Statement

The MPA program at Northeastern aspires to provide a platform where students, faculty, and communities partner to address contemporary challenges in public administration and governance. Recognizing the complexities of the fast-changing civic environment in the 21st century, we design adaptable academic and professional pathways.

Our pragmatic approach fosters an environment that invites participation from a diverse range of actors including scholars, nonprofit leaders, and policymakers. We emphasize experiential learning, inviting students to engage with real-world issues and collaboratively devise feasible solutions. We often view challenges through an urban-centered lens, and we encourage global to local perspectives.

Accountability and inclusivity lie at the heart of our program. We are committed to ethical governance and strive to create a space that values social equity and inclusion. We aim to develop change makers equipped with the skills and awareness to bring about transformative solutions that extend beyond geographic and disciplinary boundaries. By setting measurable objectives, we uphold these standards and continually assess and improve the impact of our initiatives.

Internship

The MPA program requires all students to complete an internship. We offer an optional cooperative education experience to eligible students. Northeastern's signature co-op program provides qualified master's students with a four- to six-month work experience in government, nonprofits, and the private sector—in Boston, across the United States, and globally. Students who choose to do co-op can substitute it for the internship requirement. Co-op is central to both the Northeastern experience and to the experiential liberal arts framework of the College of Social Sciences and Humanities.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose cumulative GPA falls below 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative 3.000 grade-point average is required for the core requirements.

Code	Title	Hours
Quantitative Techniques		
INSH 6500	Statistical Analysis	4
Analysis		
PPUA 6502	Economic Analysis for Policy and Planning	4
PPUA 6506	Techniques of Policy Analysis	4
Administration and Management		
PPUA 6500	Principles of Public Administration	4
PPUA 6505	Public Budgeting and Financial Management	4
PPUA 6507	Institutional Leadership and the Public Manager	4
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

Internship Requirement

Code	Title	Hours
PPUA 6861	Internship	0

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms. Both of the following courses must be taken during each co-op semester.		2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
LPSC 5000 to LPSC 7999		
POLS 5000 to POLS 7999 (by advisement only)		
PPUA 5000 to PPUA 7999		
SOCL 5000 to SOCL 7999 (by advisement only)		

Program Credit/GPA Requirements

40 total semester hours required (41–42 with optional co-op)

Minimum 3.000 GPA

Public Administration, MPA (Oakland)

Website (<https://publicaffairs.northeastern.edu/master-of-public-administration/>)

CSSH Graduate Programs General Regulations (p. 1239)

The Master of Public Administration is the management and leadership degree for those seeking to serve the public good. The program seeks to equip its students with skills in policy analysis, program evaluation, research methods, and written and verbal communications.

Students have an opportunity to develop competencies in budgeting and human resources, organizational management and leadership, and the interplay between ethics and accountability in a diverse society.

Throughout the degree program, students gain career-oriented experience through internships, small group projects, and other interactions with professionals in the field. These experiences are designed to enable the Northeastern University MPA graduate to move into a wide array of public and nonprofit sector positions at the local, state, national, and international levels. The Northeastern MPA program is nationally accredited by NASPAA.

Mission Statement

The mission of the MPA program at Northeastern is to serve the needs of the public affairs community, including students, working professionals, faculty, and researchers, by providing a practice-oriented and research-based graduate educational experience. The faculty pledges the best instruction available in a set of courses designed to integrate theoretical foundations with practical skills. The MPA program is designed to prepare students to be effective in a dynamic and increasingly diverse professional environment. We also commit ourselves to assisting students in every possible way to secure internships, postgraduate employment, and overall career advancement. Students, in turn, are expected to meet high levels of academic excellence combined with ethical and professional integrity. Committed to the ideals of public service and advancing the public interest, we seek students who share the same enthusiasm.

The MPA program requires all students to pursue an internship experience and offers an optional cooperative education experience to eligible students. Co-op is central to both the Northeastern experience and to the experiential liberal arts framework of the College of Social Sciences and Humanities. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies across the United States.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose cumulative GPA falls below 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

A cumulative 3.000 grade-point average is required for the core requirements.

Code	Title	Hours
Quantitative Techniques		
INSH 6500	Statistical Analysis	4
Analysis		
PPUA 6502	Economic Analysis for Policy and Planning	4
PPUA 6506	Techniques of Policy Analysis	4
Administration and Management		
PPUA 6500	Principles of Public Administration	4
PPUA 6505	Public Budgeting and Financial Management	4
PPUA 6507	Institutional Leadership and the Public Manager	4
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

Internship Requirement

Code	Title	Hours
PPUA 6861	Internship	0

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms. Both of the following courses must be taken during each co-op semester.		2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Experience

Code	Title	Hours
Complete 12 semester hours from the following:		12
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
LPSC 5000 to LPSC 7999		
POLS 5000 to POLS 7999 (by advisement only)		
PPUA 5000 to PPUA 7999		
SOCL 5000 to SOCL 7999 (by advisement only)		

Program Credit/GPA Requirements

40 total semester hours required (41–42 with optional co-op)

Minimum 3.000 GPA

Public Policy, MPP (Arlington)

School of Public Policy and Urban Affairs (<https://cssh.northeastern.edu/policyschool/>)

CSSH Graduate Programs General Regulations (p. 1239)

The Master of Public Policy is the recognized industry standard for those seeking careers in public policy analysis and design. The MPP degree emphasizes the analysis of data and other relevant information to enable graduates to assess public problems, develop appropriate policy responses, and evaluate program effectiveness. MPP graduates enter careers as policy analysts, researchers, consultants, program evaluators, and policymakers in a broad range of public and nonprofit settings, ranging from the local to the international, and in the private sector. At Northeastern University, the MPP joins the nationally accredited Master of Public Administration as well as our Master of Science in Urban Planning and Policy, Master of Science in Urban Informatics, Master of Science in Environmental Science and Policy, and Master of Arts in International Affairs. As such, MPP students are part of a larger School of Public Policy and Urban Affairs community of great intellectual and policy area diversity.

The MPP programs require all students to engage in an internship experience and offer an optional cooperative education experience to eligible students. Cooperative education is central to both the Northeastern experience and to the experiential liberal arts framework of the College of Social Sciences and Humanities. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States.

Please review the tuition and fees (p. 72) page as credit costs differ depending on the college that offers the course.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Methods, Statistics, and Applications Core		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
PPUA 6509 or PPUA 6506	Techniques of Program Evaluation Techniques of Policy Analysis	4
Policy Frameworks and Practice Core		
LPSC 7311	Strategizing Public Policy	4
PPUA 6502	Economic Analysis for Policy and Planning	4
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
Methods and Statistics Elective		
Complete 4 semester hours from the following:		4
INSH 7400	Quantitative Analysis	

PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy

Internship Requirement

Code	Title	Hours
PPUA 6861	Internship	0

Electives

Code	Title	Hours
Complete 12 semester hours from the following:		12
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
LPSC 5000 to LPSC 7999		
POLS 5000 to POLS 7999 (by advisement only)		
PPUA 5000 to PPUA 7999		
SOCL 5000 to SOCL 7999 (by advisement only)		

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.		1-2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

40 total semester hours required (41–42 with optional co-op)
Minimum 3.000 GPA required

Public Policy, MPP (Boston)

School of Public Policy and Urban Affairs (<https://cssh.northeastern.edu/policyschool/>)

CSSH Graduate Programs General Regulations (p. 1239)

The Master of Public Policy is the recognized industry standard for those seeking careers in public policy analysis and design. The MPP degree emphasizes the analysis of data and other relevant information to enable graduates to assess public problems, develop appropriate policy responses, and evaluate program effectiveness. MPP graduates enter careers as policy analysts, researchers, consultants, program evaluators, and policymakers in a broad range of public and nonprofit settings, ranging from the local to the international, and in the private sector. At Northeastern University, the MPP joins the nationally accredited Master of Public Administration as well as our Master of Science in Urban Planning and Policy, Master of Science in Urban Informatics, Master of Science in Environmental Science and Policy, and Master of Arts in International Affairs. As such, MPP students are part of a larger School of Public Policy and Urban Affairs community of great intellectual and policy area diversity.

The MPP programs require all students to engage in an internship experience and offer an optional cooperative education experience to eligible students. Cooperative education is central to both the Northeastern experience and to the experiential liberal arts framework of the College of Social Sciences and Humanities. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States.

Concentration in Healthcare Management and Policy

This concentration is designed to enable students to develop a deeper understanding of the contemporary healthcare sector, including the intricacies of U.S. health policy, and competencies in healthcare management. The concentration is comprised of 12 semester hours, with courses taken from health management, health policy, and electives.

Concentration in Sustainability and Climate Change Policy

This graduate concentration is available to students in the MPP program in the College of Social Sciences and Humanities. It is designed to enable MPP students to develop deeper insights into the policy dimensions of these intertwined but conceptually distinct realms of inquiry and action, in both domestic and international domains. The concentration is comprised of three courses.

Please review the tuition and fees (p. 72) page as credit costs differ depending on the college in which the course is located.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Methods, Statistics, and Applications Core		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
PPUA 6506	Techniques of Policy Analysis	4
or PPUA 6509	Techniques of Program Evaluation	
Policy Frameworks and Practice Core		
LPSC 7311	Strategizing Public Policy	4
PPUA 6502	Economic Analysis for Policy and Planning	4
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
Methods and Statistics Elective		
Complete 4 semester hours from the following:		4
INSH 7400	Quantitative Analysis	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

Internship Requirement

Code	Title	Hours
PPUA 6861	Internship	0

Concentration or Electives Option

A concentration is not required. Students may complete electives (from the elective list below) in lieu of a concentration.

- Healthcare Management and Policy Concentration (p. 1291)
- Sustainability and Climate Change Policy Concentration (p. 1292)
- Electives Option (p. 1292)

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.		1–2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

40 total semester hours required (41–42 with optional co-op)

Minimum 3.000 GPA required

CONCENTRATION IN HEALTHCARE MANAGEMENT AND POLICY

Code	Title	Hours
Health Management		
Complete one of the following:		3–4
HRMG 6220	Health Organization Management	
PPUA 5220	How Healthcare Works: Business and Policy Innovations	
STRT 6220	Strategic Management for Healthcare Organizations	

Health Policy

Complete one of the following: 3-4

PHTH 5212	Public Health Administration and Policy
PHTH 5234	Economic Perspectives on Health Policy
PPUA 5240	Health Policy and Politics

Electives*Health Elective*

Complete one of the following: 3

PHTH 5120	Race, Ethnicity, and Health in the United States
PHTH 5212	Public Health Administration and Policy
PHTH 5214	Environmental Health
PHTH 5222	Health Advocacy
PHTH 5230	Global Health
PHTH 6200	Principles and History of Urban Health
PHTH 6204	Society, Behavior, and Health

General Elective

Complete an additional course from the health elective list above or one of the following: 2

PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing

CONCENTRATION IN SUSTAINABILITY AND CLIMATE CHANGE POLICY

Code	Title	Hours
Complete 12 semester hours from the following:		12
ENVR 6150	Food Security and Sustainability	
LPSC 7312	Cities, Sustainability, and Climate Change	
PPUA 5100	Climate and Development	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5267	Climate Policy and Justice	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	
PPUA 6532	Building Resilience into Local Government	

ELECTIVES OPTION

Code	Title	Hours
Complete 12 semester hours from the following:		12
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
LPSC 5000 to LPSC 7999		
POLS 5000 to POLS 7999 (by advisement only)		
PPUA 5000 to PPUA 7999		
SOCL 5000 to SOCL 7999 (by advisement only)		

Public Policy, MPP (Oakland)School of Public Policy and Urban Affairs (<https://cssh.northeastern.edu/policyschool/>)

CSSH Graduate Programs General Regulations (p. 1239)

The Master of Public Policy is the recognized industry standard for those seeking careers in public policy analysis and design. The MPP degree emphasizes the analysis of data and other relevant information to enable graduates to assess public problems, develop appropriate policy responses, and evaluate program effectiveness. MPP graduates enter careers as policy analysts, researchers, consultants, program evaluators, and policymakers

in a broad range of public and nonprofit settings, ranging from the local to the international, and in the private sector. At Northeastern University, the MPP joins the nationally accredited Master of Public Administration as well as our Master of Science in Urban Planning and Policy, Master of Science in Urban Informatics, Master of Science in Environmental Science and Policy, and Master of Arts in International Affairs. As such, MPP students are part of a larger School of Public Policy and Urban Affairs community of great intellectual and policy area diversity.

The MPP program requires all students to engage in an internship experience and offers an optional cooperative education experience to eligible students. Cooperative education is central to both the Northeastern experience and to the experiential liberal arts framework of the College of Social Sciences and Humanities. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies across the United States.

Sustainability and Climate Change Policy Concentration

This optional concentration is designed to enable MPP students to develop deeper insights into the policy dimensions of these intertwined but conceptually distinct realms of inquiry and action, in both domestic and international domains. The concentration is comprised of three courses.

Please review the tuition and fees (p. 72) page as credit costs differ depending on the college that offers the course.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Methods, Statistics, and Applications Core		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
PPUA 6509 or PPUA 6506	Techniques of Program Evaluation Techniques of Policy Analysis	4
Policy Frameworks and Practice Core		
LPSC 7311	Strategizing Public Policy	4
PPUA 6502	Economic Analysis for Policy and Planning	4
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
Methods and Statistics Elective		
Complete 4 semester hours from the following:		4
INSH 7400	Quantitative Analysis	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

Internship Requirement

Code	Title	Hours
PPUA 6861	Internship	0

Concentration or Electives Option

A concentration is not required. Students may complete electives (from the elective list below) in lieu of the concentration.

- Sustainability and Climate Change Policy Concentration (p. 1294)
- Electives (p. 1294)

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.		
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	1-2

Program Credit/GPA Requirements

40 total semester hours required (41–42 with optional co-op)

Minimum 3.000 GPA required

SUSTAINABILITY AND CLIMATE CHANGE POLICY CONCENTRATION

Code	Title	Hours
Complete 12 semester hours from the following:		12
ENVR 6150	Food Security and Sustainability	
LPSC 7312	Cities, Sustainability, and Climate Change	
PPUA 5100	Climate and Development	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	

ELECTIVES OPTION

Code	Title	Hours
Complete 12 semester hours from the following:		12
LPSC 5000 to LPSC 7999		
PPUA 5000 to PPUA 7999		
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
POLS 5000 to POLS 7999 (by advisement only)		
SOCL 5000 to SOCL 7999 (by advisement only)		

Engineering and Public Policy, MS (Boston)

For program contact information, please visit the College of Engineering website (<https://cee.northeastern.edu/academics/graduate-studies/ms-cepp/>).

The purpose of this degree is to provide students with a background in engineering with the tools necessary to conduct robust policy analysis. It includes required core courses from the Department of Civil and Environmental Engineering and the School of Public Policy and Urban Affairs, complemented by electives in engineering and public policy, which can be met by two courses and a master's report (recommended), or by one course and a thesis, or by three courses. A minimum of 16 semester hours must be taken in the College of Engineering.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 770).

GORDON INSTITUTE OF ENGINEERING LEADERSHIP**Master's Degree in Engineering and Public Policy with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Engineering and Public Policy in addition to earning a Graduate Certificate in Engineering Leadership (p. 738). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved technical courses.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Sustainable Engineering and Systems Modeling Requirements

Code	Title	Hours
Complete 12 semester hours from the following:		12
CIVE 5261 or PPUA 5261	Dynamic Modeling for Environmental Investment and Policymaking Dynamic Modeling for Environmental Decision Making	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5368	Air Quality Management	
CIVE 6566	Sustainable Urban Transportation: Netherlands	
CIVE 6777	Climate Hazards and Resilient Cities Abroad	
CIVE 6778	Climate Adaptation and Policy Abroad	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7110	Critical Infrastructure Resilience	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
CIVE 7155	Dynamics and Control of Infrastructure Systems	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
IE 5500	Systems Engineering in Public Programs	
IE 5640	Data Mining for Engineering Applications	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
SBSY 5100	Sustainable Design and Technologies in Construction	
SBSY 5200	Sustainable Engineering Systems for Buildings	
SBSY 5400	Sustainable Building Systems Seminar	

Public Policy and Analysis Requirements

Code	Title	Hours
Complete 8 semester hours from the following:		8
INSH 5301	Introduction to Computational Statistics	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
INSH 7400	Quantitative Analysis	
LPSC 7311	Strategizing Public Policy	
PPUA 5246	Participatory Modeling for Collaborative Decision Making	
PPUA 5260	Ecological Economics	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6532	Building Resilience into Local Government	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Options

Complete one of the following options:

COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Elective Course List below. (p. 524)		12

PROJECT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
Complete 8 semester hours from the Elective Course List below. (p. 524)		8

THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
Complete 4 semester hours from the Elective Course List below. (p. 524)		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

Optional Co-op Experience

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964	Co-op Work Experience	0
or ENCP 6954	Co-op Work Experience - Half-Time	
or ENCP 6965	Co-op Work Experience Abroad	
or ENCP 6955	Co-op Work Experience Abroad - Half-Time	

Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

ELECTIVE COURSE LIST

Code	Title	Hours
CIVE 5150	Climate and Atmospheric Change	
CIVE 5250	Organic Pollutants in the Environment	
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 5670	Global Biogeochemistry	
CIVE 7230	Legal Aspects of Civil Engineering	
CIVE 7392	Special Topics in Environmental Engineering (Equity in Civil and Environmental Engineering)	
EMGT 6225	Economic Decision Making	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
ENVR 6102	Environmental Science and Policy Seminar 2	
INSH 7400	Quantitative Analysis	
INTL 5100	Climate and Development	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	

PPUA 5270	Food Systems and Public Policy
PPUA 6101	Environmental Science and Policy Seminar 1
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context
PPUA 7346	Resilient Cities

Environmental Science and Policy, MS (Boston)

The Master of Science in Environmental Science and Policy program emphasizes a broadly interdisciplinary and synthetic approach that integrates knowledge in the environmental sciences (conservation biology, climate change, fisheries science, ecosystem function, biodiversity, restoration ecology) with the social sciences (policy, economics, sociology, political science, and development) and humanities (environmental history, philosophy, and ethics). The goal of the program is to equip professionals with substantive breadth in knowledge and skills at the intersection of environmental science and policy. The program focuses on training students to think critically about the underlying causes of environmental problems and understanding the reciprocal relationships between coupled human-natural ecosystems and the interconnections between social and technological innovations. The program explores practical approaches and potential solutions that decision makers need to evaluate in policy debates related to promoting environmental sustainability.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Seminars		
PPUA 6101	Environmental Science and Policy Seminar 1	4
ENVR 6102	Environmental Science and Policy Seminar 2	4
Skills Courses		
Complete 2 courses from the following. At least one course needs to be taken from the College of Science Skills Course List and one course from the College of Social Sciences and Humanities Skills Course List.		8
<i>College of Science Skills Course List</i>		
EEMB 5130	Population Dynamics	
EEMB 5522	Experimental Design Marine Ecology	
ENVR 5150	Climate and Atmospheric Change	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
ENVR 5450	Applied Social-Ecological Systems Modeling	
ENVR 6500	Biostatistics	
<i>College of Social Sciences and Humanities Skills Course List</i>		
INSH 5301	Introduction to Computational Statistics	
INSH 6300	Research Methods in the Social Sciences	
INSH 7400	Quantitative Analysis	
LPSC 7311	Strategizing Public Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Electives

Complete five courses from the following list. At least one course must be taken from the College of Science Elective Course List and one course from the College of Social Sciences and Humanities Elective Course List. Any skills course not taken to fulfill the skills courses requirement can be taken as an elective. Students may petition to enroll in other relevant graduate courses offered by other schools at Northeastern University.

COLLEGE OF SCIENCE ELECTIVE LIST

Code	Title	Hours
EEMB 5130 - EEMB 8984		
ENVR 5115 - ENVR 6900		

COLLEGE OF SOCIAL SCIENCES AND HUMANITIES ELECTIVE LIST

Code	Title	Hours
INSH 5302	Information Design and Visual Analytics	
INTL 5100	Climate and Development	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5100 - PPUA 7346		
SOCL 7267	Environment, Health, and Society	

Program Credit/GPA Requirements

36 total semester hours required
Minimum 3.000 GPA required

Urban Informatics, MS (Arlington)

The Master of Science in Urban Informatics (MSUI) degree couples comprehensive data analytics skills with an understanding of the big questions faced by cities in the 21st-century city. This cutting-edge program is built upon a unique cross-college initiative, which offers comprehensive state-of-the-art training in the core skills of data analytics—including quantitative analysis, data mining, machine learning, and data visualization. Urban informatics students supplement training in these foundational skills with a specialized sequence of courses that address how data and technology are being used to tackle key social, infrastructural, and environmental challenges.

By combining a theoretically informed perspective of cities with advanced skills in accessing, managing, analyzing, and communicating insights from large complex, datasets, graduates are a part of the next wave of urban professionals ready to lead in the public, private, and nonprofit sectors. Given the continuous growth in urban data and technology, these professionals are essential to shaping the future of urban areas around the globe.

This program provides a uniquely integrated urban and informatics degree with a substantial experiential education component. The focus throughout is on practical application, and students have multiple opportunities to apply what they are learning.

The master's program offers an optional cooperative education experience (co-op) to eligible students. Co-op education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Please review the tuition and fee (p. 70) page as credit costs differ depending on the college in which the course resides.

CSSH Graduate Programs General Regulations (p. 1239)

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Data Science Courses		
DA 5020	Collecting, Storing, and Retrieving Data	4
or DA 5030	Introduction to Data Mining/Machine Learning	
or PPUA 7237	Advanced Spatial Analysis of Urban Systems	
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
Methods and Applications		
PPUA 5262	Big Data for Cities	4

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 SH for one term. Longer co-ops require registration at 1 SH per term for two consecutive terms:		1-2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

ELECTIVES

Code	Title	Hours
Complete 13 SH from the following:		13
Methods and Applications		
CIVE 7110	Critical Infrastructure Resilience	
CIVE 7380	Performance Models and Simulation of Transportation Networks	
CIVE 7381	Transportation Demand Forecasting and Model Estimation	
CIVE 7388	Special Topics in Civil Engineering (with prior approval of advisor)	
CIVE 7392	Special Topics in Environmental Engineering (with prior approval of advisor)	
IE 7374	Special Topics in Industrial Engineering	
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	
PPUA 5230	Housing Policy	
PPUA 5235	Participatory Community Planning Methods	
PPUA 5246	Participatory Modeling for Collaborative Decision Making	
PPUA 5268	International Environmental Policy	
PPUA 5260	Ecological Economics	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5265	Global Urbanization and Planning	
PPUA 5266	Urban Theory and Science	
PPUA 6101	Environmental Science and Policy Seminar 1	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
PPUA 7346	Resilient Cities	
Analysis		
INSH 6302	Qualitative Methods	
INSH 6406	Analyzing Complex Digitized Data	
POLS 7334	Social Networks	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 6509	Techniques of Program Evaluation	
Practicum or Capstone		
PPUA 6966 or PPUA 7673	Practicum Capstone in Public Policy and Urban Affairs	
Portfolio		
PPUA 6410	Urban Informatics Portfolio	

Program Credit/GPA Requirements

33 total semester hours required (34-35 with optional co-op)

Minimum 3.000 GPA required

Urban Informatics, MS (Boston)

The Master of Science in Urban Informatics (MSUI) degree couples comprehensive data analytics skills with an understanding of the big questions faced by cities in the 21st-century city. This cutting-edge program is built upon a unique cross-college initiative, which offers comprehensive state-

of-the-art training in the core skills of data analytics—including quantitative analysis, data mining, machine learning, and data visualization. Urban informatics students supplement training in these foundational skills with a specialized sequence of courses that address how data and technology are being used to tackle key social, infrastructural, and environmental challenges.

By combining a theoretically informed perspective of cities with advanced skills in accessing, managing, analyzing, and communicating insights from large complex datasets, graduates are a part of the next wave of urban professionals ready to lead in the public, private, and nonprofit sectors. Given the continuous growth in urban data and technology, these professionals are essential to shaping the future of urban areas around the globe.

This program provides a uniquely integrated urban and informatics degree with a substantial experiential education component. The focus throughout is on practical application, and students have multiple opportunities to apply what they are learning.

The master's program offers an optional cooperative education experience (co-op) to eligible students. Co-op education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Please review the tuition and fee (p. 70) page as credit costs differ depending on the college in which the course resides.

Climate and Resilience Concentration

This graduate concentration is available to students in the MSUI who want to specialize in the policy challenges that arise from climate change and the methodological tools designed to respond to them, especially those that help us understand and instill resilience in communities that are vulnerable to disruption. The concentration is comprised of three courses: a methods and applications course specific to the concentration; an analysis course specific to the concentration; and the requirement to complete a capstone or practicum relevant to climate and resilience.

Communities and Economic Development Concentration

This graduate concentration is available to students in the MSUI who want to specialize in the policy challenges associated with neighborhoods and communities and the methodological tools for addressing them. This includes examining more closely how communities work and the types of interventions that can help them to thrive and prosper. The concentration is comprised of three courses: a methods and applications course specific to the concentration; an analysis course specific to the concentration; and the requirement to complete a capstone or practicum relevant to communities and economic development.

Transportation and Infrastructure Concentration

This graduate concentration is available to students in the MSUI who want to specialize in the policy challenges and methods associated with transportation and related infrastructure. This includes questions of policy and operations pertaining to traffic management and public transit and the skills for analyzing mobility decisions. The concentration is comprised of three courses: a methods and applications course specific to the concentration; an analysis course specific to the concentration; and the requirement to complete a capstone or practicum relevant to transportation or infrastructure.

CSSH Graduate Programs General Regulations (p. 1239)

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Data Science Courses		
DA 5020	Collecting, Storing, and Retrieving Data	4
or DA 5030	Introduction to Data Mining/Machine Learning	
or PPUA 7237	Advanced Spatial Analysis of Urban Systems	
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
Methods and Applications		
PPUA 5262	Big Data for Cities	4

Concentrations or Electives Option

A concentration is not required. Students may complete electives option in lieu of a concentration.

- Climate and Resilience (p. 1301)
- Communities and Economic Development (p. 1301)
- Transportation and Infrastructure (p. 1302)
- Electives Option (p. 1302)

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 SH for one term. Longer co-ops require registration at 1 SH per term for two consecutive terms:		
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	1-2

Program Credit/GPA Requirements

33 total semester hours required (34-35 with optional co-op)

Minimum 3.000 GPA required

CONCENTRATION IN CLIMATE AND RESILIENCE

Code	Title	Hours
Methods and Applications		
Complete 4 semester hours from the following:		4
PPUA 5246	Participatory Modeling for Collaborative Decision Making	
PPUA 5260	Ecological Economics	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	
PPUA 7346	Resilient Cities	
Analysis		
Complete 4 semester hours from the following:		4
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	
INSH 6302	Qualitative Methods	
POLS 7334	Social Networks	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
CIVE 7000-level Special Topics in Engineering—approved by program director		
Practicum or Capstone		
Complete topic-focused capstone or practicum approved by program director:		4
PPUA 6966 or PPUA 7673	Practicum Capstone in Public Policy and Urban Affairs	
Portfolio		
PPUA 6410	Urban Informatics Portfolio	1

CONCENTRATION IN COMMUNITIES AND ECONOMIC DEVELOPMENT

Code	Title	Hours
Methods and Applications		
Complete 4 semester hours from the following:		4
IE 7374	Special Topics in Industrial Engineering (Sharing Economy Systems)	
PPUA 5230	Housing Policy	
PPUA 5235	Participatory Community Planning Methods	
PPUA 5246	Participatory Modeling for Collaborative Decision Making	
PPUA 5265	Global Urbanization and Planning	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	

Analysis

Complete 4 semester hours from the following:	4

INSH 6101	Agent-Based Modeling for Applied and Social Sciences
INSH 6302	Qualitative Methods
INSH 6406	Analyzing Complex Digitized Data
POLS 7334	Social Networks
PPUA 6509	Techniques of Program Evaluation

Practicum or Capstone

Complete topic-focused capstone or practicum approved by program director:	4

PPUA 6966	Practicum
or PPUA 7673	Capstone in Public Policy and Urban Affairs

Portfolio

PPUA 6410	Urban Informatics Portfolio	1

CONCENTRATION IN TRANSPORTATION AND INFRASTRUCTURE

Code	Title	Hours

Methods and Applications

Complete one of the following:	4

IE 7374	Special Topics in Industrial Engineering (Sharing Economy Systems)
PPUA 5246	Participatory Modeling for Collaborative Decision Making
PPUA 7346	Resilient Cities

Analysis

Complete 4 semester hours from the following:	4

CIVE 7110	Critical Infrastructure Resilience
CIVE 7380	Performance Models and Simulation of Transportation Networks
CIVE 7381	Transportation Demand Forecasting and Model Estimation
INSH 6101	Agent-Based Modeling for Applied and Social Sciences
CIVE 7000-level Special Topics in Engineering—approved by program director	

Practicum or Capstone

Complete topic-focused capstone or practicum approved by program director:	4

PPUA 6966	Practicum
or PPUA 7673	Capstone in Public Policy and Urban Affairs

Portfolio

PPUA 6410	Urban Informatics Portfolio	1

ELECTIVES OPTION

Code	Title	Hours

Methods and Applications

PPUA 5266	Urban Theory and Science	4

Analysis

Complete 4 semester hours from the following:	4

INSH 6101	Agent-Based Modeling for Applied and Social Sciences
INSH 6406	Analyzing Complex Digitized Data
POLS 7334	Social Networks
PPUA 5246	Participatory Modeling for Collaborative Decision Making
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing

Practicum or Capstone

PPUA 6966	Practicum	4
or PPUA 7673	Capstone in Public Policy and Urban Affairs	

Portfolio

PPUA 6410	Urban Informatics Portfolio	1

Urban Planning and Policy, MS (Boston)

The Master of Science in Urban Planning and Policy program trains leaders interested in building just and sustainable solutions to today's critical urban problems. Students in the program develop the theoretical and analytical tools to understand contemporary challenges of social, racial, and environmental injustice in cities and urban regions. They develop professional tools to work effectively in the realms of planning, policy, politics, and advocacy to impact urban challenges, including affordable housing provision, equitable and sustainable economic growth, sustainable transportation, and climate change adaptation and mitigation. This innovative program combines the expertise in urban planning and policy analysis data analytics of the School of Public Policy and Urban Affairs with expertise in physical planning, design, and data visualization at the School of Architecture. The core curriculum of the program provides students with a solid foundation in essential skills and concepts, including techniques of effective community engagement, research design and statistics, economic analysis, legal foundations of urban planning and policy, and the history of urban development and urban planning. Students also have the opportunity to develop substantial expertise in a specialization area, including urban analytics, urban sustainability and resilience, urban design and physical planning, and urban development policy and planning.

The optional cooperative education experience (co-op) is available to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

In addition to the co-op option, students in the program have opportunities to gain experience in the application of their knowledge and skills via internships, class projects, and a capstone research report. They graduate prepared for careers working for state and local government, federal agencies, community development corporations and other nonprofit organizations, research institutes, and as private-sector planning consultants.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Planning and Policy		
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
PPUA 6502	Economic Analysis for Policy and Planning	4
SUEN 6340	Topics in Urban Environmental Design	4
Research Design		
INSH 6300	Research Methods in the Social Sciences	4
Quantitative Techniques		
Students in the urban analytics focus area are encouraged to take INSH 5301.		
Choose one from the following:		4
INSH 5301	Introduction to Computational Statistics	
INSH 6500	Statistical Analysis	
Planning Law		
Choose one from the following:		2-4
LPSC 5201	Law and the City	
PPUA 5201	Urban Planning and the Law	
Planning and Social Justice		
Choose one from the following:		2-4
PPUA 5233	Contemporary Community Development	
PPUA 5235	Participatory Community Planning Methods	
PPUA 6219	Race, Justice, and Belonging in Planning Practice	

Focus Areas

Complete one of the following focus areas:

- Urban Design and Physical Planning (p. 255)
- Urban Analytics (p. 256)
- Sustainability and Resilience (p. 256)
- Urban Development Policy and Planning (p. 256)

URBAN DESIGN AND PHYSICAL PLANNING

Code	Title	Hours
Gateway Course		
ARCH 6340	Graduate Topics in Architecture	4
Tracks		
Complete one of the following tracks:		8
<i>Urban Design and Real Estate</i>		
ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
<i>Physical Planning and Design for Sustainable Urbanism</i>		
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
<i>Urban Experience Track</i>		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
ARTG 6310	Design for Behavior and Experience	
Capstone		
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	6

URBAN ANALYTICS

Code	Title	Hours
Gateway Course		
PPUA 5262	Big Data for Cities	4
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

SUSTAINABILITY AND RESILIENCE

Code	Title	Hours
Gateway Course		
LPSC 7312 or SUEN 6310	Cities, Sustainability, and Climate Change Cities, Nature, and Design in Contemporary History and Theory	4
Methods		
Complete one of the following:		4
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
SUEN 7230	Urban Ecologies and Technologies 1	
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
Elective		
Complete one of the following:		4
PPUA 5231	Transportation Policy	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	

SUEN 6340	Topics in Urban Environmental Design
SUEN 7230	Urban Ecologies and Technologies 1
SUEN 7240	Urban Ecologies and Technologies 2
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments

URBAN DEVELOPMENT POLICY AND PLANNING

Code	Title	Hours
Gateway Course		
Complete one of the following:		4
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5233	Contemporary Community Development	
PPUA 5265	Global Urbanization and Planning	
Methods		
PPUA 5263 or PPUA 5236	Geographic Information Systems for Urban and Regional Policy Introduction to Real Estate Development for Urban Policy Makers	4
Capstone		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
Elective		
Complete one of the following:		4
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers	
PPUA 5265	Global Urbanization and Planning	
PPUA 5270	Food Systems and Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6551	Nonprofit Organizations and Social Change	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6340	Topics in Urban Environmental Design	

Electives

Code	Title	Hours
Complete 4-8 semester hours of the following:		4-8
ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
ARCH 6100	Graduate Skills Studio	
ARCH 6330	Seminar in Modern Architecture	
ARCH 6340	Graduate Topics in Architecture	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
ARTG 5130	Visual Communication for Information Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6330	Information Design Mapping Strategies	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5302	Information Design and Visual Analytics	
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	

PPUA 5234	Land Use and Urban Growth Policy
PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers
PPUA 5238	Climate Change and Global Urbanization
PPUA 5244	Comparative Public Policy and Administration
PPUA 5245	Education Policy in the United States
PPUA 5249	Sustainable Urban Coastal Policy
PPUA 5260	Ecological Economics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change
PPUA 5265	Global Urbanization and Planning
PPUA 5270	Food Systems and Public Policy
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing
PPUA 6506	Techniques of Policy Analysis
PPUA 6551	Nonprofit Organizations and Social Change
PPUA 7237	Advanced Spatial Analysis of Urban Systems
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems
SUEN 6210	Implementation and Visualization for Urban Environments 1
SUEN 6220	Implementation and Visualization for Urban Environments 2
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory
SUEN 6340	Topics in Urban Environmental Design
SUEN 7230	Urban Ecologies and Technologies 1
SUEN 7240	Urban Ecologies and Technologies 2
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments

Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration:		2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

Program Credit/GPA Requirements

48 total semester hours required (50 with optional co-op)

Minimum 3.000 GPA required

Law, JD / Public Policy, MPP (Boston)

The JD/Master of Public Policy (MPP) is designed to equip graduates with a unique blend of skills for navigating a complex and rapidly changing policy landscape. The program builds on students' legal training with a compelling blend of skills in applied public policy analysis, policy design, and strategic policy formation. Students also gain career-relevant experience through internships, small group capstone projects, and other interactions with professionals in the field. All are part of a learning process designed to enable the Northeastern law and public policy graduates to navigate, and to redefine, diverse policy areas.

Ideally, students would apply to Northeastern's JD and MPP programs simultaneously. Those who apply and are admitted to both programs take MPP classes after completing their first year in the School of Law. Applicants may also be considered after they have enrolled in the JD program; interested JD students should consult the School of Law's Office of Academic and Student Affairs and the School of Public Policy and Urban Affairs graduate program director for more information.

Students enrolled in this dual-degree program will be able to count 8 JD credit hours toward their MPP degree and 12 MPP credit hours toward their JD degree. Students should consult advisors in each program if they have questions about which courses may be shared between degrees.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

Nonprofit Sector, Philanthropy, and Social Change, Graduate Certificate (Arlington)

School of Public Policy and Urban Affairs (<https://cssh.northeastern.edu/policyschool/>)

CSSH Graduate Programs General Regulations (p. 1239)

The Graduate Certificate in Nonprofit Sector, Philanthropy, and Social Change is a response to recent developments in social change theory, practice, and funding that are placing new demands and expectations on social change actors in the nonprofit, public, and private sectors, including nonprofit leaders, philanthropists, policymakers, and corporate social responsibility managers. These developments include the emergence of hybrid, cross-sector business models and new intermediary mechanisms for channeling the flow of capital into social change; new expectations and standards for performance measurement, transparency, and accountability; more sophisticated use of data and technology to support decision making, evaluation, and continual improvement; decreased public funding for traditional nonprofit activities; and the emergence of social media as a vehicle for mobilizing people and resources. The certificate enables social change professionals in all sectors to respond to these changes more effectively and will distinguish itself from other nonprofit certificate programs by focusing on the relationship between social program implementation and funding.

The certificate is a professionally oriented, application-based program for students seeking leadership positions in nonprofit organizations or in a public agency that deals extensively with nonprofits. The curriculum is designed to address the distinctive features and practices of the nonprofit sector and emphasizes management techniques helpful to nonprofit leaders.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose GPA falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirement

Code	Title	Hours
PPUA 6551	Nonprofit Organizations and Social Change	4

Electives

Code	Title	Hours
Complete 8 semester hours from the following. Courses outside this list may be taken as electives with approval of the graduate program director.		8

PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing
PPUA 6503	Managing People in Public and Nonprofit Sectors
PPUA 6509	Techniques of Program Evaluation
PPUA 6522	Administrative Ethics and Public Management
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs
PPUA 6553	Nonprofit Financial Management
PPUA 6554	NGO Management and International Development

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Nonprofit Sector, Philanthropy, and Social Change, Graduate Certificate (Boston)

School of Public Policy and Urban Affairs (<https://cssh.northeastern.edu/policyschool/>)

CSSH Graduate Programs General Regulations (p. 1239)

The Graduate Certificate in Nonprofit Sector, Philanthropy, and Social Change is a response to recent developments in social change theory, practice, and funding that are placing new demands and expectations on social change actors in the nonprofit, public, and private sectors, including nonprofit leaders, philanthropists, policymakers, and corporate social responsibility managers. These developments include the emergence of hybrid, cross-sector business models and new intermediary mechanisms for channeling the flow of capital into social change; new expectations and standards for performance measurement, transparency, and accountability; more sophisticated use of data and technology to support decision making, evaluation, and continual improvement; decreased public funding for traditional nonprofit activities; and the emergence of social media as a vehicle for mobilizing people and resources.

people and resources. The certificate enables social change professionals in all sectors to respond to these changes more effectively and will distinguish itself from other nonprofit certificate programs by focusing on the relationship between social program implementation and funding.

The certificate is a professionally oriented, application-based program for students seeking leadership positions in nonprofit organizations or in a public agency that deals extensively with nonprofits. The curriculum is designed to address the distinctive features and practices of the nonprofit sector and emphasizes management techniques helpful to nonprofit leaders.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose GPA falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirement

Code	Title	Hours
PPUA 6551	Nonprofit Organizations and Social Change	4

Electives

Code	Title	Hours
Complete 8 semester hours from the following. Courses outside this list may be taken as electives with approval of the graduate program director.		8

PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing
PPUA 6503	Managing People in Public and Nonprofit Sectors
PPUA 6509	Techniques of Program Evaluation
PPUA 6522	Administrative Ethics and Public Management
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs
PPUA 6553	Nonprofit Financial Management
PPUA 6554	NGO Management and International Development

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Public Policy Analysis, Graduate Certificate (Arlington)

CSSH Graduate General Regulations (p. 1239)

The Graduate Certificate in Public Policy Analysis seeks to provide students with the tools to analyze and shape public policy at the local, state, and national levels. Students have an opportunity to gain an understanding of the political and legal processes of policymaking, develop skills central to conducting research on policy questions, and learn techniques for evaluating the effectiveness of competing policies.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Core Requirements

Students may not reuse required degree courses for the certificate.

Code	Title	Hours
Analysis Methods and Skills		
Complete 8 semester hours from the following:		8
INSH 5302	Information Design and Visual Analytics	
INSH 6300	Research Methods in the Social Sciences	
LPSC 7311	Strategizing Public Policy	
or PPUA 6506	Techniques of Policy Analysis	

PPUA 5260	Ecological Economics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 6502	Economic Analysis for Policy and Planning
PPUA 6509	Techniques of Program Evaluation
PPUA 7237	Advanced Spatial Analysis of Urban Systems

Policy

Complete 4 semester hours from the following: 4

PPUA 5220	How Healthcare Works: Business and Policy Innovations
PPUA 5230	Housing Policy
PPUA 5231	Transportation Policy
PPUA 5232	Immigration and Urban America
PPUA 5234	Land Use and Urban Growth Policy
PPUA 5240	Health Policy and Politics
PPUA 5245	Education Policy in the United States
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change
PPUA 5269	Social Policy: Design, Implementation, and Critique
PPUA 5270	Food Systems and Public Policy
PPUA 6232	Designing Global Economic and Social Policy

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Public Policy Analysis, Graduate Certificate (Boston)

CSSH Graduate General Regulations (p. 1239)

The Graduate Certificate in Public Policy Analysis seeks to provide students with the tools to analyze and shape public policy at the local, state, and national levels. Students have an opportunity to gain an understanding of the political and legal processes of policymaking, develop skills central to conducting research on policy questions, and learn techniques for evaluating the effectiveness of competing policies.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements**Core Requirements**

Students may not reuse required degree courses for the certificate.

Code	Title	Hours
Analysis Methods and Skills		
Complete 8 semester hours from the following:		8
INSH 5302	Information Design and Visual Analytics	
INSH 6300	Research Methods in the Social Sciences	
LPSC 7311	Strategizing Public Policy	
or PPUA 6506	Techniques of Policy Analysis	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Policy

Complete 4 semester hours from the following:		4
PPUA 5220	How Healthcare Works: Business and Policy Innovations	
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5240	Health Policy and Politics	
PPUA 5245	Education Policy in the United States	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5269	Social Policy: Design, Implementation, and Critique	
PPUA 5270	Food Systems and Public Policy	
PPUA 6232	Designing Global Economic and Social Policy	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Sustainability and Climate Change Policy, Graduate Certificate (Boston)

This graduate certificate, a collaboration between the School of Public Policy and the School of Law, is designed to prepare students for the dynamic, evolving landscape of climate and sustainability policy. Interest in the area of climate and sustainability policy is expanding rapidly among graduate students in multiple programs throughout Northeastern University and among professionals who may be considering graduate coursework at Northeastern. This certificate provides students from multiple backgrounds an option for gaining interdisciplinary skills and perspectives in climate and sustainability policy. Given the growing need in every organization—including private sector, public sector, and nonprofits—for professionals with knowledge and training in how to respond to the rapidly changing policy and regulatory frameworks in climate and sustainability, this certificate is open to JD, master's, and PhD students throughout the university. Students not presently enrolled in a Northeastern degree program are also welcome to apply for admission to this graduate certificate program.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Policy		
Complete 12 semester hours from the following:		12
ENVR 5350	Sustainable Energy and Climate Solutions	
LAW 7329 and PPUA 6966	Environmental Law and Practicum	
or LW 7329 and PPUA 6966	Environmental Law and Practicum	
LAW 7634 and PPUA 6966	Energy Law and Policy and Practicum	
or LW 7634 and PPUA 6966	Energy Law and Policy and Practicum	
LPSC 7312	Cities, Sustainability, and Climate Change	
PPUA 5100	Climate and Development	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5267	Climate Policy and Justice	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	

PPUA 6101

Environmental Science and Policy Seminar 1

PPUA 6532

Building Resilience into Local Government

- ¹ Students enrolled in Northeastern University colleges other than the School of Law should contact a School of Law advisor at lawstudentaffairs@northeastern.edu for guidance on registering for courses from the School of Law.

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Urban Analytics, Graduate Certificate (Boston)

CSSH Graduate General Regulations (p. 1239)

With 75 percent of the world's population projected to be living in cities by 2050, the need for professionals in urban planning and related careers will only increase. The Graduate Certificate in Urban Analytics seeks to prepare students outside of the Master of Science in Urban Informatics program to manage the progressively complex issues involved with rapidly expanding data and technological resources in cities. As Claire Lane of the City of Boston recently noted, "The blueprints for great cities are increasingly anchored in big data, expressed in GIS [Geographic Information Systems] and codified in coherent policy." Successful graduates with an urban analytics certificate have skills in each of these areas, which prepares them to be professionals ready to shape the future of cities across the globe.

Students are trained with the practical and theoretical knowledge necessary to understand the intricacies of interconnected urban systems and to analyze how these systems work together to create sustainable, resilient, and just cities. The curriculum emphasizes the expertise needed to bridge emerging technological capacities and traditional policymaking processes. Students cultivate applied skills in visual presentation, analysis, and modeling of new data sets—all of which helps to inform investment and policymaking. Inspired by Northeastern's leadership in experiential education, students use Boston and cities around the world as learning labs.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
PPUA 5262	Big Data for Cities	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4

Elective

Code	Title	Hours
Complete 4 semester hours from the following or another elective in consultation with your faculty advisor:		4
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	
PPUA 5246	Participatory Modeling for Collaborative Decision Making	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5266	Urban Theory and Science	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Urban Studies, Graduate Certificate (Boston)

CSSH Graduate Programs General Regulations (p. 1239)

The Graduate Certificate in Urban Studies provides a foundation in the fundamentals of urban planning and policy theory for students outside the Master of Science in Urban Planning and Policy degree. It also allows students to pursue course work in a range of areas of concentration, including housing and community development, urban environmental sustainability, economic development, international comparative urban policy, and transportation.

Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirement

Code	Title	Hours
Complete 4 semester hour course:		
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4

Focus Area Selective

Code	Title	Hours
Complete 4 semester hours from the following:		
LPSC 7312	Cities, Sustainability, and Climate Change	4
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5233	Contemporary Community Development	
PPUA 5235	Participatory Community Planning Methods	
PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers	
PPUA 5262	Big Data for Cities	
PPUA 5265	Global Urbanization and Planning	
PPUA 6532	Building Resilience into Local Government	
SUEN 6340	Topics in Urban Environmental Design	

Elective

Code	Title	Hours
Complete 4 semester hours in the following range (selected by advisement):		
PPUA 5000 to PPUA 7999		4

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Sociology

Website (<https://cssh.northeastern.edu/socant/>)

Liza Weinstein, PhD

Associate Professor and Department Chair

l.weinstein@northeastern.edu

617.373.3235

Eileen Otis, PhD

Associate Professor of Sociology and Graduate Program Director, Sociology

e.otis@northeastern.edu

socant@northeastern.edu

CSSH Graduate Programs General Regulations (p. 1239)

The Department of Sociology and Anthropology at Northeastern University is home to a distinguished graduate program offering a Doctor of Philosophy in Sociology. The primary objectives of our graduate program are to offer a strong curricular foundation in sociology and the social

sciences; to inculcate in students a depth of knowledge in the basic tools of the discipline; to train our students to be outstanding teachers and researchers; and to provide professional socialization that adequately prepares students for a career in the discipline.

The PhD program boasts a wide array of curricular strengths and diverse methodological offerings, all of which draw upon the department's emphasis on the study of social inequalities along lines of race, class, and gender. Faculty expertise ranges widely from domestic U.S. concerns to issues that affect groups, regions, and societies on a global scale. We boast strengths in 11 different research foci (<https://cssh.northeastern.edu/socant/research-foci/>):

- Gender, sexuality, and intersectionality
- Political change and social movements
- Work, labor, and economic insecurity
- Global economy and culture
- Violence, conflict, and security
- Cities and urbanization
- Health and health equity
- Environment and environmental justice
- Racial identity, racism, and anti-racism
- Migration and immigrant communities
- Science and technology studies

The PhD program is designed to admit relatively small numbers of graduate students each year, which affords students the opportunity to forge close working relationships with the faculty. Our faculty and graduate students work together in a number of interdisciplinary research projects, programs, and centers including the Social Science Environmental Health Research Institute (<https://cssh.northeastern.edu/ssehri/>); the Brudnick Center on Violence and Conflict (<https://cssh.northeastern.edu/brudnickcenter/>); the Dukakis Center for Urban and Regional Policy (<https://cssh.northeastern.edu/dukakiscenter/>); and the Institute for Health Equity and Social Justice Research (<https://bouve.northeastern.edu/institute-for-health-equity-and-social-justice-research/>). Many of the faculty in the Department of Sociology and Anthropology have additional interests and are affiliated with other departments on campus including environmental studies; law and public policy; Latino, Latin American, and Caribbean studies; African American studies; international affairs; Jewish studies; and criminal justice. Students who wish to work with faculty in other disciplines are encouraged to enlist the aid of the sociology graduate director or their advisors in contacting individual faculty members.

Programs

Doctor of Philosophy

- Sociology (Boston) (p. 1313)

Sociology, PhD (Boston)

The Department of Sociology and Anthropology at Northeastern University is home to a distinguished graduate program offering a PhD in Sociology. The primary objectives of our graduate program are to offer a strong curricular foundation in sociology and the social sciences; to inculcate in students a depth of knowledge in the basic tools of the discipline; to train our students to be outstanding teachers and researchers; and to provide professional socialization that adequately prepares students for a career in the discipline.

The PhD program is designed to attract students who wish to develop a broad base of sociological knowledge, such as would equip students to embark on academic careers in leading institutions of higher education. The PhD program boasts a wide array of curricular strengths and diverse methodological offerings, all of which draw upon the department's emphasis on the study of social inequalities along lines of race, class, and gender. Faculty expertise ranges widely from domestic U.S. concerns to issues that affect groups, regions, and societies on a global scale.

The PhD program is designed to admit relatively small numbers of graduate students each year, which affords students the opportunity to forge close working relationships with the faculty. Our faculty and graduate students work together in a number of interdisciplinary research projects, programs, and centers, including the Social Science Environmental Health Research Institute (<http://www.northeastern.edu/environmentalhealth/>); the Brudnick Center on Violence and Conflict (<http://www.northeastern.edu/brudnickcenter/>); the Dukakis Center for Urban and Regional (<http://www.northeastern.edu/dukakiscenter/>) Policy; and the Institute for Health Equity and Social Justice Research (<https://bouve.northeastern.edu/institute-for-health-equity-and-social-justice-research/>). Many of the faculty in the Department of Sociology and Anthropology have additional interests and are affiliated with other departments on campus, including environmental studies; law and public policy; Latino, Latin American, and Caribbean studies; African American studies; international affairs; Jewish studies; and criminal justice. Students who wish to work with faculty in other disciplines are encouraged to enlist the aid of the sociology graduate director or their advisors in contacting individual faculty members.

Admissions

Students interested in the PhD apply directly to that program. Students admitted without a master's degree earn the Master of Arts in Sociology en route once PhD coursework is completed. Please note that all applicants for the doctoral program are required to submit a writing sample that should consist of written materials that demonstrate their capacity for scholarship at the doctoral level. (Copies of several course or term papers or a copy of a master's thesis or paper are appropriate.)

Coursework

Doctoral students are required to complete 60 standard credit hours (SH) with grades of B or higher if coming in with a bachelor’s degree and 40 credit hours if coming in with a master’s degree in sociology. Students admitted without a master’s degree earn the MA in sociology en route to completing their PhD requirements (30 credits).

Required courses cover the core areas of sociological theory, research methods, and statistical analysis. All students must take courses in these areas regardless of their areas of specialization. Students must fulfill these requirements during their first year in the program. Students entering our program may be able to substitute courses taken at the prior institution for some or all of these requirements by submitting a course waiver form (a course waiver does not waive the associated semester hour requirement) or transfer of credit (courses submitted with a transfer of credit cannot have counted toward another degree).

FOUR PROSEMINARS

Proseminars provide students structure for their first two years in the PhD program to help ensure their professionalization into the discipline and to help them move more smoothly through program requirements.

Each course meets weekly for 60-minute sessions throughout each fall and spring semester for the student’s first two years. Each 1-credit course will be taken on a satisfactory/unsatisfactory (pass/fail) basis. In order to receive a satisfactory grade, students must attend most proseminar class meetings, complete the requirements for the proseminar course in a satisfactory manner, and attend most intellectual and professional development events organized by the department. Proseminar 1 and 2 are completed in the first year; Proseminar 3 and 4 are completed in the second year.

POST COURSEWORK BUT PRIOR TO PROPOSAL DEFENSE

Students must complete two field statements prior to their proposal defense and will register for Exam Preparation—Doctoral (SOCL 8960) (with the field statement chair listed as instructor of record).

Once field statements are complete and students are working on their dissertation proposal, students should register for a Research course (with their committee chair listed as instructor of record) until the proposal is successfully defended.

DEGREE CANDIDACY

To enter into degree candidacy, the student must have earned a Master of Arts degree or its departmental semester-hour equivalent, completed the four proseminars, successfully defended two field statements, and defended their dissertation proposal.

Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MA in Sociology (<https://catalog.northeastern.edu/graduate/social-sciences-humanities/sociology/sociology-ma/>) degree. In addition, students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MA in Sociology (<https://catalog.northeastern.edu/graduate/social-sciences-humanities/sociology/sociology-ma/>) degree. Note that no students will be admitted directly into the MA in Sociology (<https://catalog.northeastern.edu/graduate/social-sciences-humanities/sociology/sociology-ma/>) to pursue a master’s degree.

Program Requirements

Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

- Annual review
- Two field statements
- Dissertation committee
- Dissertation proposal
- PhD candidacy
- Dissertation defense

Core Requirements

Code	Title	Hours
Foundations		
SOCL 7200	Foundations of Social Theory 1	4
SOCL 7201	Foundations of Social Theory 2	4
Proseminars		
SOCL 7001	Proseminar 1: Acclimating to Graduate School	1
SOCL 7002	Proseminar 2: Academic Planning	1
SOCL 7003	Proseminar 3: Committee, Topics, and Reading Lists	1
SOCL 7004	Proseminar 4: Field Statement Writing	1
Research Methods		

INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
Advanced Methods		
Complete 8 semester hours from the following. Courses not listed need approval from student's advisor:		8
INSH 6302	Qualitative Methods	
INSH 6406	Analyzing Complex Digitized Data	
INSH 7300	Advanced Research Methods in the Social Sciences and Humanities	
INSH 7400	Quantitative Analysis	
INSH 7500	Advanced Quantitative Analysis	
INSH 7600	Multilevel Theorizing and Analysis	
PHTH 6320	Qualitative Methods in Health and Illness	
PPUA 6509	Techniques of Program Evaluation	

Electives

Code	Title	Hours
Complete 32 semester hours in the following ranges. Courses in additional disciplines may be allowed with prior advisor approval:		32
CRIM 6000 to CRIM 7999		
INSH 6000 to INSH 7999		
POLS 6000 to POLS 7999		
PPUA 6000 to PPUA 7999		
SOCL 6000 to SOCL 7999		
WMNS 6000 to WMNS 7999		

Dissertation

Code	Title	Hours
Exam Preparation		
Required for students who must maintain full-time status while completing comprehensive exam. Must take twice:		
SOCL 8960	Exam Preparation—Doctoral	
Research		
SOCL 8986	Research	
Dissertation		
SOCL 9990	Dissertation Term 1	
SOCL 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of two semesters of dissertation, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
SOCL 9996	Dissertation Continuation	

Progression Requirements

Students who receive two grades below B may be placed on academic probation and risk being separated from the program.

Program Credit/GPA Requirements

60 total semester hours required

Minimum 3.500 GPA required

Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Annual review

Two field statements

Dissertation committee

Dissertation proposal

PhD candidacy

Dissertation defense

Core Requirements

Code	Title	Hours
Foundations		
SOCL 7200	Foundations of Social Theory 1	4
SOCL 7201	Foundations of Social Theory 2	4
Proseminars		
SOCL 7001	Proseminar 1: Acclimating to Graduate School	1
SOCL 7002	Proseminar 2: Academic Planning	1
SOCL 7003	Proseminar 3: Committee, Topics, and Reading Lists	1
SOCL 7004	Proseminar 4: Field Statement Writing	1
Research Methods		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
Advanced Methods		
Complete 8 semester hours from the following. Courses not listed need approval from student's advisor:		8
INSH 6302	Qualitative Methods	
INSH 6406	Analyzing Complex Digitized Data	
INSH 7300	Advanced Research Methods in the Social Sciences and Humanities	
INSH 7400	Quantitative Analysis	
INSH 7500	Advanced Quantitative Analysis	
INSH 7600	Multilevel Theorizing and Analysis	
PHTH 6320	Qualitative Methods in Health and Illness please note this course is only 3 credits	
PPUA 6509	Techniques of Program Evaluation	

Electives

Code	Title	Hours
Complete 12 semester hours in the following ranges. Courses in additional disciplines need student's advisor approval:		12
CRIM 6000 to CRIM 7999		
INSH 6000 to INSH 7999		
POLS 6000 to POLS 7999		
PPUA 6000 to PPUA 7999		
SOCL 6000 to SOCL 7999		
WMNS 6000 to WMNS 7999		

Dissertation

Code	Title	Hours
Exam Preparation		
Students register for this course while writing each of their two field statements. Must take twice:		
SOCL 8960	Exam Preparation—Doctoral	
Research		
SOCL 8986	Research	
Dissertation		
SOCL 9990	Dissertation Term 1	
SOCL 9991	Dissertation Term 2	
Dissertation Continuation		
Following completion of two semesters of dissertation, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
SOCL 9996	Dissertation Continuation	

Progression Requirements

Students who receive two grades below B may be placed on academic probation and risk being separated from the program.

Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.500 GPA required

Interdisciplinary Programs

Doctor of Philosophy (PhD)

- Network Science (Boston) (p. 241)

Master of Science (MS)

- Applied Quantitative Methods and Social Analysis (Arlington)
- Applied Quantitative Methods and Social Analysis (Boston)
- Complex Network Analysis (Boston)
- Extended Realities (Boston)

Graduate Certificate

- AI Applications (Boston) (p. 190)
- Computational Social Science (Arlington) (p. 1334)
- Computational Social Science (Boston) (p. 1333)
- Data Analytics (Boston) (p. 416)
- Information Ethics (Boston) (p. 1334)
- Women's, Gender, and Sexuality Studies (Boston) (p. 1335)

Network Science, PhD (Boston)

The PhD in Network Science program aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is a multidisciplinary program, with members of the Northeastern University Network Science Institute (<https://www.networkscienceinstitute.org/>) representing a range of fields including computer science, information science, physics, complexity, sociology, communication, data visualization, organizational behavior, political science, population health, and epidemiology.

This doctoral program is a joint collaboration across five academic colleges. Students are admitted to the College of Social Sciences and Humanities and may choose to move to the home college of their dissertation advisor after they reach candidacy (once they pass their dissertation proposal/comprehensive exam). Students follow policies of their home college, including dissertation format and submission deadlines for graduation. Faculty supervisors may be from one of the following Northeastern academic colleges:

- College of Science
- College of Social Sciences and Humanities
- Khoury College of Computer Sciences
- Bouvé College of Health Sciences
- College of Arts, Media and Design

Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of elective courses relevant to the student's area of research. Electives should be discussed with the student's faculty advisor. A minimum of 40 semester hours of coursework is required, though the faculty advisor or program committee may recommend additional coursework based on student research skills.

Alternative Course Path

Students have the option to complete core coursework in their first year of study. This curriculum pathway is expected to be taken by students whose admitting advisor is located outside of the Boston campus and elsewhere in the Northeastern network.

Annual Review

A review of satisfactory progress will be ongoing and formally evaluated at the end of each academic year. Students must maintain a cumulative grade-point average of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain a 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for dismissal by the graduate program committee.

As part of the annual review process, the students will be asked to submit a summary of completed and future courses and research. Students will submit to the program committee:

- A list of courses completed in the last academic year and course plan for the following year
- A short synopsis of their research progress and research plans for the next year

Qualifying Examination

The qualifying exam is an hour-long oral examination of the material covered in the core curriculum and consists of questions selected by network science faculty. One month prior to the exam., students receive between 50 to 80 study questions to prepare. Students will be asked to give a short presentation of their research plans, followed by an oral exam where the qualifying exam panel will ask a subset of the review questions.

Students must take the exam by the fall semester of their third year. If students fail the qualifying exam on their first attempt, they may retake the exam in the following semester. Students who do not pass the exam after two attempts will be asked to leave the program.¹

Dissertation Committee

Students must confirm their dissertation advisor by the end of their second year. The dissertation advisor must be a full-time, tenured, tenure-track, research, or teaching faculty member of Northeastern. The advisor should be a network science doctoral program faculty member, unless the student receives approval by the network science program committee.

Students must confirm their dissertation committee prior to their comprehensive exam. The committee must consist of a minimum of four members:

1. A dissertation advisor
2. A core member of the Network Science Institute faculty
3. An additional tenured/tenure-track, research, or teaching faculty member from the Network Science Institute or other Northeastern faculty approved by the advisor and program committee
4. One member recognized as an expert in the specific topic of research, who can be external to Northeastern.

Dissertation Proposal (Comprehensive Examination)

The comprehensive exam should be completed in the student's fourth year of study. The exam consists of two parts: preparation of the dissertation proposal and oral presentation of the proposal. Students must prepare a written comprehensive research proposal describing the dissertation research plan including review of relevant literature, research questions, motivation, methods, any preliminary results, and potential impact. The proposal must be shared with the doctoral committee members two weeks prior to the scheduled presentation.

Students will give a 30-minute oral presentation to their committee members that is open to the public. Following the presentation, the dissertation committee will assess the proposed research plan and provide feedback to the student. If the proposal and/or presentation do not meet the expectations of the committee, the student will be asked to revise their proposal and/or their presentation. The completion of the comprehensive exam is considered successful if the dissertation committee approves as satisfactory both the written proposal and the oral presentation. Students may repeat the comprehensive exam once. If they are unsuccessful in their second attempt, the program will ask the student to leave the program.

PhD Candidacy

A student is considered a doctoral candidate upon completion of the required coursework with a minimum cumulative GPA of 3.000, a passing score on the qualification exam, and satisfactory completion of the comprehensive exam.

Dissertation

A PhD student should aim to complete their dissertation in their fifth year of study. Upon successful completion of the research plan proposed in the dissertation proposal, the candidate has an opportunity to prepare the dissertation for approval by the dissertation committee. The dissertation must contain results of extensive research and make an original contribution to the field. The work should give evidence of the candidate's ability to carry out independent research. It is expected that the dissertation consists of one or more research studies of sufficient quality to merit publication in a reputable journal(s).

Dissertation Defense

Like the dissertation proposal, the dissertation defense consists of two parts: the written dissertation and the defense oral presentation. The PhD candidate should send the written dissertation to their dissertation committee at least one month prior to the dissertation defense.

The oral dissertation defense will be open to the public and will include a Q&A session. Following the presentation, the dissertation committee will communicate their assessment of whether they consider the candidate's dissertation requirement fulfilled. Once the dissertation requirement is fulfilled, the PhD candidate is ready to graduate. Students then apply to graduate and follow the formatting guidelines and deadlines of their home college.

¹Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MS in Network Science degree. Note that no students will be admitted directly into the MS in Network Science to pursue a master's degree.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Milestones

Coursework
 Annual reviews
 Qualifying exam
 Dissertation committee
 Dissertation proposal (comprehensive examination)
 Dissertation

Dissertation defense

Core Requirements

Code	Title	Hours
Students must complete all 20 semester hours of the core courses listed below, unless the program director approves changes to the student's course plan:		
NETS 5116	Network Science 1	4
NETS 6116	Network Science 2	4
NETS 7332	Machine Learning with Graphs	4
NETS 7334	Social Networks	4
NETS 7335	Dynamical Processes in Complex Networks	4

Electives

Code	Title	Hours
Complete 20 semester hours from the following elective course options.		20

The student's elective course plan should be discussed with, and approved by, their advisor. Students who seek to apply courses not on this list to fulfill program requirements must obtain written approval from their advisor and the program director. Elective options below are organized by domain areas. Students may take courses from one or more domain areas.

Computational Social Science

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5314	Complexity in Social Systems
CNET 5411	Financial and Economic Networks
CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
NETS 7341	Network Economics
NETS 7350	Bayesian and Network Statistics
NETS 7360	Research Design for Social Networks
NETS 7370	Computational Urban Science
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHYS 7332	Network Science Data 2

Computer Science

CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
CS 5800	Algorithms
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6220	Data Mining Techniques
CS 7180	Special Topics in Artificial Intelligence
CS 7260	Visualization for Network Science
CS 7295	Special Topics in Data Visualization
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar
PHYS 7332	Network Science Data 2

Epidemiology and Public Health

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5515	Complex Network Analysis for Biological Systems
CNET 5901	Visualizing Complex Networks
CNET 5902	Communicating Network Data
NETS 7370	Computational Urban Science
NETS 7976	Directed Study
NETS 7983	Topics
NETS 8941	Network Science Literature Review Seminar

PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6202	Intermediate Epidemiology
PHTH 6400	Principles of Population Health 1
PHTH 6410	Principles of Population Health 2
PHTH 6800	Causal Inference in Public Health Research
PHYS 7332	Network Science Data 2

Mathematic and Physics

CNET 5901	Visualizing Complex Networks
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CS 5800	Algorithms
MATH 7233	Graph Theory
MATH 7243	Machine Learning and Statistical Learning Theory 1
NETS 7976	Directed Study
NETS 8941	Network Science Literature Review Seminar
PHYS 5211	Introduction to Scientific Computing
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
PHYS 7332	Network Science Data 2

Dissertation

Code	Title	Hours
Precandidacy		

Students should register for NETS 8986 after passing the qualifying exam and before completing the comprehensive exam (proposal defense):

NETS 8986	Research

Dissertation

After passing the comprehensive exam (reaching candidacy), students should register for NETS 9990 and NETS 9991, successively:

NETS 9990	Dissertation Term 1
NETS 9991	Dissertation Term 2

Dissertation Continuation

After completing both NETS 9990 and NETS 9991, students should register for NETS 9996 each semester until graduation:

NETS 9996	Dissertation Continuation

Program Credit/GPA Requirements

40 total semester hours required
Minimum 3.000 GPA required

Plan of Study

Typical Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
Elective course		4 NETS 7334	4
Elective course		4 One elective course	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
NETS 7332		4 NETS 7335	4
One elective course		4 One elective course	4
		8	8

Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0
Total Hours: 40			

Alternate Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
NETS 7332		4 NETS 7334	4
One elective course		4 NETS 7335	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
Elective		4 Elective	4
Elective		4 Elective	4
		8	8
Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0
Total Hours: 40			

Applied Quantitative Methods and Social Analysis, MS (Boston)

The Master of Science in Applied Quantitative Methods and Social Analysis is an interdisciplinary, flexible, and innovative degree that focuses on quantitative research methods for social analysis strategies and techniques. The program integrates the interdisciplinary perspectives and methodological and analytical tools across the College of Social Sciences and Humanities. The program seeks to educate ambitious social scientists and analysts primed to deploy computational tools for social analysis and tackle social science questions of equity, hierarchy, social organization, and social systems. The 21st-century economy will increasingly demand a workforce capable of collecting, processing, analyzing, and interpreting large-scale data on human attributes, personal preferences, social attributes, and political behavior. In response, this program provides students with rigorous training in quantitative research and social science methods to address important questions of social inquiry. Emphasizing public dissemination of findings, the program is designed to prepare students to inform policymakers, decision makers in the private and public sectors, and the broader community. These skills prepare graduates to pursue analytical or research careers in corporations, nonprofits, and public services or to continue their education.

Students in this degree program will have the opportunity to gain advanced training in statistical analysis and research methodology aligned to key areas of strength in CSSH, including data analytics in the social sciences, computational social science, network analysis in the social sciences, statistical methods in the social sciences, information ethics for social analysis, geospatial analysis, and the digital humanities. Students will also have the opportunity to stack a range of graduate certificate programs into the master's degree.

The program will take advantage of various co-op opportunities—positions such as policy analysts, network scientists, econometricians, and crime analysts—that provide students with a professional environment to integrate quantitative skills and social analysis. The learning opportunities in professional settings (private sector, government, or nonprofit sector) reinforce the development of advanced quantitative skills and their applied nature to contemporary social issues. Ultimately, the Master of Science in Applied Quantitative Methods and Social Analysis will position students to enter the labor force with the competitive advantage of these experiences and skills.

CSSH Graduate Programs General Regulations (p. 1239)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Core Requirements		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4

Required Concentration

Complete one of the following concentrations:

- Computational Social Science (p. 1322)
- Data Analytics in the Social Sciences (p. 1323)
- Information Ethics for Social Analysis (p. 1323)
- Machine Learning and Econometrics (p. 1323)
- Network Analysis in the Social Sciences (p. 1323)
- Statistical Methods in the Social Sciences (p. 1323)

ELECTIVES

Code	Title	Hours
Complete 12 semester hours from the following:		12
Concentration courses may not be double counted as elective courses.		
CRIM, ECON, INSH, POLS, PPUA, and/or SOCL at the 5000 level or higher		

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.		1-2
INSH 6864	Experiential Integration	
INSH 6964	Co-op Work Experience	

Program Credit/GPA Requirements

32 total semester hours required (33–34 with optional co-op)

Minimum 3.000 GPA required

CONCENTRATION IN COMPUTATIONAL SOCIAL SCIENCE

Code	Title	Hours
Concentration Requirements		
DA 5030	Introduction to Data Mining/Machine Learning	4
INSH 5302	Information Design and Visual Analytics	4
or POLS 7334	Social Networks	
or PPUA 5262	Big Data for Cities	
or PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

INSH 6406	Analyzing Complex Digitized Data	4
or INSH 5301	Introduction to Computational Statistics	

CONCENTRATION IN DATA ANALYTICS IN THE SOCIAL SCIENCES

Code	Title	Hours
Concentration Requirements		
DA 5020	Collecting, Storing, and Retrieving Data	4
or DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

CONCENTRATION IN INFORMATION ETHICS FOR SOCIAL ANALYSIS

Code	Title	Hours
Concentration Requirements		
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4
PHIL 5001	Global Justice	4
or PHIL 5002	Ethics and Public Policy	
or PHIL 5010	AI Ethics	
PHIL 5005	Information Ethics	4

CONCENTRATION IN MACHINE LEARNING AND ECONOMETRICS

Code	Title	Hours
Concentration Requirements		
ECON 5140	Applied Econometrics	4
ECON 5210	Machine Learning in Economics	4
ECON 5220	Computational Finance and Financial Econometrics	4

CONCENTRATION IN NETWORK ANALYSIS IN THE SOCIAL SCIENCES

Code	Title	Hours
Concentration Requirements		
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
INSH 6304	Modeling and Analyzing Social Networks	4
or POLS 7334	Social Networks	

CONCENTRATION IN STATISTICAL METHODS IN THE SOCIAL SCIENCES

Code	Title	Hours
Concentration Requirements		
INSH 5301	Introduction to Computational Statistics	4
INSH 7400	Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4

Applied Quantitative Methods and Social Analysis, MS (Arlington)

The Master of Science in Applied Quantitative Methods and Social Analysis is an interdisciplinary, flexible, and innovative degree that focuses on quantitative research methods for social analysis strategies and techniques. The program integrates the interdisciplinary perspectives and methodological and analytical tools across the College of Social Sciences and Humanities. The program seeks to educate ambitious social scientists and analysts primed to deploy computational tools for social analysis and tackle social science questions of equity, hierarchy, social organization, and social systems. The 21st-century economy will increasingly demand a workforce capable of collecting, processing, analyzing, and interpreting large-scale data on human attributes, personal preferences, social attributes, and political behavior. In response, this program provides students with rigorous training in quantitative research and social science methods to address important questions of social inquiry. Emphasizing public dissemination of findings, the program prepares students to inform policymakers, decision makers in the private and public sectors, and the broader community. These skills prepare graduates to pursue analytical or research careers in corporations, nonprofits, and public services or to continue their education.

Students in this degree program will have the opportunity to gain advanced training in statistical analysis and research methodology aligned to key areas of strength in CSSH, including data analytics in the social sciences, computational social science, network analysis in the social sciences,

statistical methods in the social sciences, information ethics for social analysis, geospatial analysis, and the digital humanities. Students will also have the opportunity to stack a range of graduate certificate programs into the master's degree.

The program will take advantage of various co-op opportunities—positions such as policy analysts, network scientists, econometricians, and crime analysts—that provide students a professional environment to integrate quantitative skills and social analysis. The learning opportunities in professional settings (private sector, government, or nonprofit sector) reinforce the development of advanced quantitative skills and their applied nature to contemporary social issues. Ultimately, the Master of Science in Applied Quantitative Methods and Social Analysis will position students to enter the labor force with the competitive advantage of these experiences and skills.

CSSH Graduate Programs General Regulations (p. 1239)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
Core Requirements		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4

Required Concentration

Complete one of the following concentrations:

- Computational Social Science (p. 1325)
- Data Analytics in the Social Sciences (p. 1325)
- Network Analysis in the Social Sciences (p.)

ELECTIVES

Code	Title	Hours
Complete 12 semester hours from the following:		12
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
ECON 5140	Applied Econometrics	
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
PHYS 5116	Network Science 1	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.		1-2
INSH 6864	Experiential Integration	
INSH 6964	Co-op Work Experience	

Program Credit/GPA Requirements

32 total semester hours required (33-34 with optional co-op)

Minimum 3.000 GPA required

CONCENTRATION IN COMPUTATIONAL SOCIAL SCIENCE

Code	Title	Hours
Concentration Requirements		
DA 5030	Introduction to Data Mining/Machine Learning	4
INSH 5302	Information Design and Visual Analytics	4
or POLS 7334	Social Networks	
or PPUA 5262	Big Data for Cities	
or PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
INSH 6406	Analyzing Complex Digitized Data	4
or INSH 5301	Introduction to Computational Statistics	

CONCENTRATION IN DATA ANALYTICS IN THE SOCIAL SCIENCES

Code	Title	Hours
Concentration Requirements		
DA 5020	Collecting, Storing, and Retrieving Data	4
or DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

CONCENTRATION IN NETWORK ANALYSIS IN THE SOCIAL SCIENCES

Code	Title	Hours
Concentration Requirements		
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
POLS 7334	Social Networks	4

Complex Network Analysis, MS (Boston)

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master's degree program in complex network analysis methodologies. The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business
4. Biological systems modeling used across research and industry including network biology, drug discovery, or multi-omics mining

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Biological Networks—College of Science
- Complex Social Systems—College of Social Sciences and Humanities
- Economic and Technological Networks—Khoury College of Computer Sciences
- Population Health Dynamics—Bouvé College of Health Sciences

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CNET 5050	Fundamentals of Complex Networks	4
CNET 5051	Analyzing Complex Network Data	4
CNET 5052	Advanced Tools for Complex Network Analysis	4
CNET 5901	Visualizing Complex Networks	2
CNET 5902	Communicating Network Data	2

Concentrations

Complete one of the following concentrations:

- Complex Biological Networks (p. 167)—College of Science
- Complex Social Systems (p. 168)—College of Social Sciences and Humanities
- Economic and Technological Networks (p. 168)—Khoury College of Computer Sciences
- Population Health Dynamics (p. 169)—Bouv  College of Health Sciences

Experiential Courses

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		4
CNET 6107	Complex Network Analysis Research Rotation	
CNET 6108	Complex Network Analysis Capstone	
CNET 6990	Thesis	

Optional Co-op

Code	Title	Hours
CNET 6000	Professional Development for Co-op	1
CNET 6964	Co-op Work Experience	0

Program Credit/GPA Requirements

Minimum 33 total semester hours required

Additional hours may be required based on student choice of courses or concentration.

One semester hour of additional coursework is required for participation in co-op.

Minimum 3.000 GPA required

CONCENTRATION IN COMPLEX BIOLOGICAL NETWORKS—COLLEGE OF SCIENCE

Code	Title	Hours
A minimum of 16 semester hours is required to complete this concentration.		
Required		
CNET 5515	Complex Network Analysis for Biological Systems	4
Complete 8 semester hours from the following:		8
BINF 6308	Bioinformatics Computational Methods 1	
BINF 6310	Introduction to Bioinformatics	
EEMB 5130	Population Dynamics	
ENVR 5450	Applied Social-Ecological Systems Modeling	
MATH 5131	Introduction to Mathematical Methods and Modeling	
MATH 7340	Statistics for Bioinformatics	
PHYS 5211	Introduction to Scientific Computing	
Complete 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouv� College of Health Sciences concentrations for this section):		4
CNET 5126	Spreading on Networks: From Epidemics to Memes	

CNET 5314	Complexity in Social Systems
CNET 5411	Financial and Economic Networks
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CNET 6099	Special Topics in Complex Networks

CONCENTRATION IN COMPLEX SOCIAL SYSTEMS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours

A minimum of 13 semester hours is required to complete this concentration.

Required

CNET 5314	Complexity in Social Systems	3

Complete a minimum of 6 semester hours from the following: 6

CNET 5311	Physical and Digital Human Traces
CNET 5360	Research Design for Social Networks
INSH 5301	Introduction to Computational Statistics
INSH 6101	Agent-Based Modeling for Applied and Social Sciences
INSH 6300	Research Methods in the Social Sciences
INSH 6304	Modeling and Analyzing Social Networks
INSH 6406	Analyzing Complex Digitized Data
INSH 6500	Statistical Analysis
PHYS 5211	Introduction to Scientific Computing
PPUA 5262	Big Data for Cities
PPUA 7237	Advanced Spatial Analysis of Urban Systems

Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section): 4

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5411	Financial and Economic Networks
CNET 5515	Complex Network Analysis for Biological Systems
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CNET 6099	Special Topics in Complex Networks

CONCENTRATION IN ECONOMIC AND TECHNOLOGICAL NETWORKS—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours

A minimum of 14 semester hours is required to complete this concentration.

Required

CNET 5411	Financial and Economic Networks	3

Complete a minimum of 7 semester hours from the following: 7

CS 7150	Deep Learning
CS 7200	Statistical Methods for Computer Science
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
MISM 6212	Data Mining and Machine Learning for Business
PHYS 5211	Introduction to Scientific Computing

Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section): 4

CNET 5126	Spreading on Networks: From Epidemics to Memes
CNET 5314	Complexity in Social Systems
CNET 5515	Complex Network Analysis for Biological Systems
CNET 6061	Analyzing Higher-Order Networks
CNET 6063	Probabilistic Mathematics of Networks
CNET 6099	Special Topics in Complex Networks

CONCENTRATION IN POPULATION HEALTH DYNAMICS—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
A minimum of 14 semester hours is required to complete this concentration.		
Required		
CNET 5126	Spreading on Networks: From Epidemics to Memes	4
Complete a minimum of 6 semester hours from the following:		6
BINF 6308	Bioinformatics Computational Methods 1	
PHTH 5210	Biostatistics in Public Health	
PHTH 6210	Applied Regression Analysis	
PHTH 6224	Social Epidemiology	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6800	Causal Inference in Public Health Research	
PHTH 6801	Causal Inference 1	
PHYS 5211	Introduction to Scientific Computing	
Complete a minimum of 4 semester hours from the following (students may opt to take the required course in the College of Science or Bouvé College of Health Sciences concentrations for this section):		4
CNET 5314	Complexity in Social Systems	
CNET 5411	Financial and Economic Networks	
CNET 5515	Complex Network Analysis for Biological Systems	
CNET 6061	Analyzing Higher-Order Networks	
CNET 6063	Probabilistic Mathematics of Networks	
CNET 6099	Special Topics in Complex Networks	

Extended Realities, MS (Boston)

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality.

This program is structured to allow students flexibility and specialization to choose a path that matches their interest. Students have an opportunity to focus on a concentration area that matches their professional background and aspirations.

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. Students will follow all policies associated with their home college. The concentrations are associated with the following colleges:

- Khoury College of Computer Sciences
 - Artificial Intelligence
 - Human Computer Interaction
- D'Amore-McKim School of Business
 - Entrepreneurship
 - Marketing
- Bouvé College of Health Sciences
 - Human Movement Science
- College of Social Sciences and Humanities
 - Information Ethics
 - Public History
- College of Engineering
 - Wireless Networking
- College of Arts, Media and Design
 - XR and Design
 - XR and Games
 - XR and Media

The Master of Science in Extended Realities welcomes students from a diverse range of backgrounds because of the applications of XR technology used in many disciplines and industries including medicine, business, entertainment, architecture, and journalism.

Some concentrations may require a technical background and are noted in the requirements.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Extended Reality Core

Code	Title	Hours
Required Courses		
EXRE 5010 and EXRE 5011	Immersive Media: Extended Realities (XR) History, Theory, and Impact and Seminar for EXRE 5010	5
EXRE 5020	Developing Extended Realities (XR)	4
EXRE 5030	Designing Extended Realities (XR)	4
EXRE 7500 or EXRE 7990	Extended Realities (XR) Project Thesis	4
GSND 5122	Business Models in the Game Industry	1

Extended Reality Concentration Options

Complete one of the following options:

- Artificial Intelligence (p. 176)—Khoury College of Computer Sciences
- Entrepreneurship (p. 176)—D'Amore-McKim School of Business
- Human Computer Interaction (p. 176)—Khoury College of Computer Sciences
- Human Movement Science (p. 176)—Bouvé College of Health Sciences
- Information Ethics (p. 177)—College of Social Sciences and Humanities
- Marketing (p. 177)—D'Amore-McKim School of Business
- Public History (p. 177)—College of Social Sciences and Humanities
- Wireless Networking (p. 178)—College of Engineering
- XR and Design (p. 178)—College of Arts, Media and Design
- XR and Games (p. 178)—College of Arts, Media and Design
- XR and Media (p. 178)—College of Arts, Media and Design

Program Credit/GPA Requirements

34 total semester hours required. Some concentrations may require more than 34 semester hours to complete.

Minimum 3.000 GPA required

CONCENTRATION IN ARTIFICIAL INTELLIGENCE—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Requires a background in computer science.		
CS 5097	Mixed Reality	4
CS 5100	Foundations of Artificial Intelligence	4
CS 6120	Natural Language Processing	4
CS 6140 or DS 5220	Machine Learning Supervised Machine Learning and Learning Theory	4

CONCENTRATION IN ENTREPRENEURSHIP—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
INNO 6200	Enterprise Growth and Innovation	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	

ENTR 6250	Lean Design and Development
ENTR 6300	Managing a Technology-Based Business
GE 5030	Iterative Product Prototyping for Engineers
INNO 6230	Platform Innovation
MKTG 6214	New Product Development

CONCENTRATION IN HUMAN COMPUTER INTERACTION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Required Courses		
CS 5340	Computer/Human Interaction	4
Electives		
Complete 12 semester hours from the following:		12
ARTG 5710	Design for Dignity	
CS 5097	Mixed Reality	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 6350	Empirical Research Methods	
CS 7390	Special Topics in Human-Centered Computing	
GSND 6340	Biometrics of Design	

CONCENTRATION IN HUMAN MOVEMENT SCIENCE—BOUVÉ COLLEGE OF HEALTH SCIENCES

Code	Title	Hours
Required Courses		
GSND 6340	Biometrics of Design	4
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
Electives		
Complete 7–8 semester hours from the following:		7-8
PT 5133	Kinesiology	
PT 5150	Motor Control, Development, and Learning	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 5410	Functional Human Neuroanatomy	
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	
PT 7020	Technologies in Movement and Rehabilitation Science	

CONCENTRATION IN INFORMATION ETHICS—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
Electives		
Complete 8 semester hours from the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

CONCENTRATION IN MARKETING—D'AMORE-MCKIM SCHOOL OF BUSINESS

Code	Title	Hours
Required Courses		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6285	Creating Customer Value through Artificial Intelligence	3
Electives		
Complete 12 semester hours from the following:		12

MKTG 6210	Marketing Research
MKTG 6212	International Marketing
MKTG 6214	New Product Development
MKTG 6216	Market Focused Strategy
MKTG 6218	Managing Customer Engagement in a Service World
MKTG 6222	Digital Marketing
MKTG 6223	Brand and Advertising Management
MKTG 6226	Consumer Behavior
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit
MKTG 6234	Marketing Analytics

CONCENTRATION IN PUBLIC HISTORY—COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

Code	Title	Hours
Required Courses		
HIST 5237	Issues and Methods in Public History	4
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1 (to be taken twice)	
Electives		
Complete 8 semester hours from the following:		8
HIST 5241	Exhibits and Museums	
HIST 7250	Topics in Public History (Public History and Slavery)	
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)	

CONCENTRATION IN WIRELESS NETWORKING—COLLEGE OF ENGINEERING

Code	Title	Hours
Required Courses		
EECE 5512	Networked XR Systems	
EECE 7374	Fundamentals of Computer Networks	
Electives		
Complete 8 semester hours from the following:		8
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	

CONCENTRATION IN XR AND DESIGN—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5640	Prototyping for Experience Design	4
EXRE 6500	Extended Realities (XR) Studio	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	

CONCENTRATION IN XR AND GAMES—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4

1332	AI Applications, Graduate Certificate (Boston)		
GSND 5110 and GSND 5111	Game Design and Analysis and Seminar for GSND 5110		5
Electives			
Complete 8 semester hours from the following:			8
GSND 6000	Advanced Topics in Game Design		
GSND 6001	Advanced Topics in Game Science		
GSND 6240	Exploratory Concept Design		
GSND 6250	Spatial and Temporal Design		
GSND 6330	Player Experience		
GSND 6340	Biometrics of Design		
GSND 6350	Data-Driven Game Design		
GSND 6460	Generative Game Design		

CONCENTRATION IN XR AND MEDIA—COLLEGE OF ARTS, MEDIA AND DESIGN

Code	Title	Hours
Required Courses		
EXRE 6500	Extended Realities (XR) Studio	4
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4
Elective		
Complete 4 semester hours from the following:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics	
JRNL 6341	Telling Your Story with Data	

Plan of Study
Sample Plan of Study

The following is a sample plan of study for a student in the Concentration in XR and Games.

Year 1			
Fall	Hours	Spring	Hours
EXRE 5010 and EXRE 5011		5 EXRE 5030	4
EXRE 5020		4 GSND 5110 and GSND 5111	5
		9	9
Year 2			
Fall	Hours	Spring	Hours
EXRE 6500		4 EXRE 7500	4
GSND 5122		1 XR and games elective 2	4
XR and games elective 1		4	
		9	8

Total Hours: 35

AI Applications, Graduate Certificate (Boston)

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- College of Social Sciences and Humanities
- D'Amore-McKim School of Business
- Mills College at Northeastern

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

Experiential Courses

Code	Title	Hours
Complete 4 semester hours from the following:		4
CRIM 6600	Justice, Technology, and AI	
EDUT 6150	AI in Education	
HLTH 5800	AI Across the Health Sciences	
IE 5640	Data Mining for Engineering Applications	
JRNL 6460	AI in Media Industries	
MISM 6250	Strategic AI for Business	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Computational Social Science, Graduate Certificate (Boston)

The certificate highlights how big data, computational analysis, and related techniques can be used to shed light on theoretical and policy questions in the fields of public policy, public health, sociology, criminal justice, political science, economics, computer science, and network science. The certificate will contribute to students' understanding of:

- How to collect, analyze, and interpret insights culled from applying computational analyses to big data in social science domains
- The ways in which computational analysis can be used to develop policy and evaluate policy outcomes and results

The field is new and developing rapidly, and employers are eager to hire students trained in this area—both because computational social science is at the cutting edge of interdisciplinary work and because it offers new opportunities for research and analysis. This certificate leverages the real-world relevance of big data, source data, machine learning, and predictive analytics, which are dominant aspects of the contemporary workplace landscape. The certificate is available on the Boston campus and online modalities.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INSH 5301 or INSH 6406	Introduction to Computational Statistics Analyzing Complex Digitized Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4

Elective

Code	Title	Hours
Complete 4 SH from the following:		4
INSH 5302	Information Design and Visual Analytics	
POLS 7334	Social Networks	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5262	Big Data for Cities	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Computational Social Science, Graduate Certificate (Arlington)

The certificate highlights how big data, computational analysis, and related techniques can be used to shed light on theoretical and policy questions in the fields of public policy, public health, sociology, criminal justice, political science, economics, computer science, and network science. The certificate will contribute to students' understanding of:

- How to collect, analyze, and interpret insights culled from applying computational analyses to big data in social science domains
- The ways in which computational analysis can be used to develop policy and evaluate policy outcomes and results

The field is new and developing rapidly, and employers are eager to hire students trained in this area—both because computational social science is at the cutting edge of interdisciplinary work and because it offers new opportunities for research and analysis. This certificate leverages the real-world relevance of big data, source data, machine learning, and predictive analytics, which are dominant aspects of the contemporary workplace landscape.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
DA 5030	Introduction to Data Mining/Machine Learning	4
INSH 5301 or INSH 6406	Introduction to Computational Statistics Analyzing Complex Digitized Data	4

Elective

Code	Title	Hours
Complete 4 semester hours from the following:		4
INSH 5302	Information Design and Visual Analytics	
POLS 7334	Social Networks	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5262	Big Data for Cities	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Information Ethics, Graduate Certificate (Boston)

The Graduate Certificate in Information Ethics is intended to help students build a working knowledge of the primary theories, frameworks, concepts, and issues in information ethics, as well as to help students develop robust skills in ethical analysis and evaluation.

Students who complete the certificate will be able to conduct comprehensive ethics and value analysis and assessment of emerging issues and problems related to such things as data collection, management, and use; design and implementation of artificial intelligence and machine learning; development and deployment of autonomous systems; and online, networked, and digital experiences and systems.

The certificate is open to students in any graduate program at Northeastern.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Note: At least two of the three courses taken to fulfill the certificate requirements must be PHIL courses.

Core Requirements

Code	Title	Hours
Complete two of the following:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010 or PHIL 5110	AI Ethics Responsible AI	

Elective

Code	Title	Hours
Complete one of the following. The elective course must be different than the core courses:		4
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010 or PHIL 5110	AI Ethics Responsible AI	

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Women's, Gender, and Sexuality Studies, Graduate Certificate (Boston)

Website (<https://cssh.northeastern.edu/wgss/>)

The Graduate Certificate in Women's, Gender, and Sexuality Studies (WGSS) is designed for students currently enrolled in a Northeastern University master's or doctoral program. The certificate aims to provide enhanced competency by:

- Analyzing contemporary feminist theoretical frameworks, methodologies, issues, and topics and their relation to established disciplines
- Focusing on the intersection of gender with sexuality, race, class, and other vectors of power and identity
- Broadening and enriching analytical skills in one or more disciplines while drawing on the interdisciplinary perspectives of WGSS
- Challenging the traditional separation of academic theory from political and professional practice

Prospective certificate students are advised initially to consult with the WGSS program director and the advisor in their home department to develop a plan for completing the certificate.

In addition to the College of Social Sciences and Humanities certificate, there is a specialized pathway for students enrolled in the Master of Public Health program (p. 869). These students are able to apply theories, concepts, and methods gained from the WGSS certificate to urban health issues. Students work closely with advisors in their home school and in WGSS to select a course of study to complete the certificate, including incorporating gender and sexuality studies into their MPH coursework as final projects/papers and naming a WGSS faculty member to their capstone committee, if using the capstone as an elective for the certificate. Students using the capstone toward their certificate must also enroll in a 1-credit directed study with the WGSS faculty who will sit on their committee. *Note:* Students pursuing the BS/MPH accelerated program and WGSS certificate should wait until they have *matriculated* into the MPH program to declare the certificate and to begin coursework toward the WGSS certificate.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Foundational Requirement

Code	Title	Hours
All students, regardless of disciplinary background, must complete one of the following:		
WMNS 6100	Theorizing Gender and Sexuality	4
WMNS 7100	Queer Theory: Sexualities, Genders, Politics	
or SOCL 7100	Queer Theory: Sexualities, Genders, Politics	

General Option

Code	Title	Hours
Electives		
Complete two courses according to the instructions from the electives list (below the MPH option). At least one should come from outside the student's home department.		8

MPH Option

Code	Title	Hours
MPH students should plan to take one foundational required course from the list above and to focus final projects in core MPH courses on gender/sexuality in public health.		
Electives		
Complete 8 semester hours according to the instructions from the electives list. One course may be the capstone, if the topic selected focuses on gender and/or sexuality in connection to the selected urban health issue and the student enrolls in a 1-semester-hour directed study with the WGSS faculty member who will sit on the capstone committee.		8

Electives List

Code	Title	Hours
At least one course must come from outside the student's home discipline. Any foundational course not taken to complete the required foundational coursework may be taken as an elective but may not count as both the foundational requirement and an elective. Electives outside this list, particularly special topics courses not listed here, may be chosen in consultation with program director. Students may also consider courses at the Graduate Consortium for Studies of Gender, Culture, Women, and Sexuality (located at MIT). MPH students, in conversation with their advisors, may substitute PHTH 6910 for one elective.		
ECON 5292	Gender and Development Economics	
JRNL 5250	Gender in the Newsroom	
PHTH 6910	Public Health Capstone (with 1-SH directed study)	
SOCL 7100	Queer Theory: Sexualities, Genders, Politics	
SOCL 7231	Sociology of Prejudice and Violence	
WMNS 5240	Feminist Resistance	
or SOCL 5240	Feminist Resistance	
or HIST 5240	Feminist Resistance	
WMNS 6100	Theorizing Gender and Sexuality (if not taken as core course)	
WMNS 7100	Queer Theory: Sexualities, Genders, Politics (if not taken as core course)	
or SOCL 7100	Queer Theory: Sexualities, Genders, Politics	
WMNS 7900	Special Topics in Women's, Gender, and Sexuality Studies	
WMNS 7976	Directed Study	

Program Credit/GPA Requirements

12 total semester hours required
Minimum 3.000 GPA required

Mills College at Northeastern

Website

Beth D. Kochly, PhD, Dean of Mills College at Northeastern

Bryan Aja, MA, Director of Faculty Affairs

Meryl F. Bailey, JD, PhD, Associate Dean of Curriculum and Network Programs

Sarayu Prakash, MAcc, MCom, Associate Dean of Administration and Finance

Priya M. Shimpi Driscoll, PhD, Associate Dean of Research, Scholarship, and Social Impact

Mills College at Northeastern University

Office of the Dean

510.430.2290

Mills_College@Northeastern.edu

Mills College at Northeastern University educates leaders who build a socially, economically, and environmentally sustainable future for all. Through interdisciplinary programs, innovative research with our community partners, and real-world hands-on experiences, our students develop transferable skills that empower them to challenge the status quo. Our graduates elevate well-being and economic justice, leverage frontier technology, lead with empathy, create with purpose, and inspire collective action toward an equitable, prosperous, and vibrant world.

Programs

Master of Arts (MA)

- Early Childhood Education (p. 1341) (Oakland)
- Educational Leadership (p. 1344) (Oakland)
- Multiple Subject Education (p. 1345) (Oakland)
- Single Subject Education (p. 1346) (Oakland)

Graduate Certificate

- AI Applications (p. 190) (Boston)

Academic Policies and Procedures

- Academic Appeals Policy (p. 1338)
- Changes in Requirements (p. 1340)
- Continuity of Registration (p. 1340)
- Course Registration and Advising (p. 1340)
- Grading (p. 1340)
- Satisfactory Progress (p. 1341)
- Student Complaints and Grievance Process (p. 1341)
- Time Limitation (p. 1341)

Academic Appeals Policy

Northeastern University affirms that it is essential to provide an appeals mechanism to students who believe that they have been erroneously, capriciously, or otherwise unfairly treated. Information about the university appeals process and procedures can be found in this catalog (p. 133).

If a student feels that they have been the victim of harassment or of discrimination prohibited by law or by university policy, and that this constitutes a substantive basis for the appeal, they should consult with the Office for University Equity and Compliance (<https://ouec.northeastern.edu/>) as soon as they become aware of alleged prohibited harassment or discrimination, and they are not required to wait until a term grade or determination is received before seeking advice or redress. If the OUEC is advised of such alleged prohibited conduct as part of an academic appeal, the appeal shall first be pursued and investigated through the OUEC. Following a resolution of the harassment/discrimination issues, any remaining academic issues will be addressed, at the request of the student, according to the academic appeals procedures.

Before invoking the appeals procedures, students are encouraged to speak informally to their instructors or academic advisors about any determination or grade about which they have questions. If students choose to pursue an appeal, the Mills College at Northeastern process is described in the appeals section that follows. The Mills College Curriculum Committee serves as the Academic Appeals Committee for MCNU.

Graduate Academic Appeals Committee

The Academic Appeals Committee for MCNU is an ad hoc committee composed of the voting members of the MCCC. If the faculty member is a member of the MCCC at the time of the appeal, the dean of MCNU will appoint a replacement committee member for purposes of the appeal.

The chair of the Academic Appeals Committee is the associate dean of curriculum for MCNU, who can be contacted at otp-mcnu-grad-education@northeastern.edu.

The Academic Appeals Committee is convened in order to determine whether a fair and due process was used to determine the student's grade.

The role of the committee is:

- In the instance of an appeal of dismissal, to determine whether a fair and due process was used.
- In the instance of a grade appeal, to conduct a review when a grade appeal is filed by a student for one of the following reasons:
 - The course grading policy was not applied consistently to all students within a class and/or section.
 - The instructor's method of assigning grades differed from the method outlined in the instructor's course syllabus.
 - The instructor failed to provide a clear policy on how grades would be assigned.

Grade Appeals

If a graduate student wishes to dispute a grade in a course taught by a member of the MCNU faculty, the first step is for the student to discuss their concerns with the faculty member who taught the course to see if it is possible to reach agreement on the issue(s). If the student is not able to resolve their issues with the faculty member who taught the course, the student should work with the program director to attempt a department-level resolution.

If these informal attempts to resolve the issue fail, the student can enter the formal procedure at the college level.

The student should meet with the associate dean for curriculum, who will attempt to resolve the issue by working with the instructor and the department/program. Contact the associate dean for curriculum at otp-mcnu-grad-education@northeastern.edu to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine whether or not there is just cause to convene the Academic Appeals Committee.

The decision to convene the Academic Appeals Committee will be based upon the following:

- The student sincerely attempted to resolve the complaint with the professor and the department/program.
- The complaint is substantive in nature (adjudication could affect student's course grade and/or academic record).

- The complaint has been brought forward in a timely manner.
 - The statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student.
 - If a student wishes to dispute a grade in their final term, this must be done within 28 calendar days of degree conferral date.

If the associate dean determines the appeal should be brought to the Academic Appeals Committee, the student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean.

- The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint.
 - It is the student's responsibility to make their case. Students may submit any evidence such as emails, quizzes, examinations, etc.
 - Information about the statement can be found under *Step 2 Prepare an Appeal Statement* in the Academic Appeals Policies and Procedures (p. 133) in this catalog.
- Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the faculty member and to the program director and convene a meeting of the Academic Appeals Committee.
- If the student fails to provide a thoughtful and well-reasoned written summary of the case, then the matter will be considered closed at the college level.
- The associate dean will make a good faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of their statement.

Appeals Meeting

The student and the faculty member have the right to attend and present their case orally to the committee. The faculty member and the student are not required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the committee may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. The complainant and the faculty member both have the right to testify privately and separately before the committee. Lawyers are not permitted in these proceedings. Generally, the faculty member and complainant are each given a 15-minute period to present their case.

The student usually presents their complaint to the committee first. The committee may then ask the complainant any questions they have based upon either the written statement submitted by the complainant or the complainant's oral presentation. The faculty member then presents their case, which is followed by questions from the committee. After both the complainant and faculty member have addressed the committee, the committee then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the committee believes it cannot resolve any issues without additional information, the committee may request any information needed from either the complainant, faculty member, or department/program. This information must be provided to the committee within one week of the meeting. If the requested information is not provided in the required time frame, then the committee may weigh this failure in making its final determination regarding the original complaint.

Committee Process

- All decisions of the committee will be made based on a simple majority (51%) vote.
- The chair of the committee only votes when there is a tie.
- The student bringing the complaint to the committee carries the burden of proof based on the weight of the evidence in demonstrating that the grade is incorrect or unjustified.
- If the committee decides that the grading process was unfair, the committee can request that the instructor changes the student's grade.
 - If an acceptable agreement involves a change of grade, the instructor is responsible for submitting a change of grade to the Office of the University Registrar in a timely manner following notification of the committee's decision.

The student shall be notified within 3 business days of a decision being reached. If the student or the faculty member is not satisfied with the committee's disposition of the matter, or if the grade appeal is not resolved within 35 calendar days after the written statement is submitted to the college, they may further pursue the matter by requesting in writing that the university convene an academic appeals resolution committee to review the issue. This must be submitted within 10 calendar days of the notification from the college. This committee has been designated as the final authority on these matters. Students may obtain information on this process by contacting the Office of the Provost.

Academic Dismissal Appeal

If a student wishes to dispute an academic dismissal, the first step is to consult the associate dean for curriculum about appealing to the department/program. If and when all departmental appeals are exhausted, the student can enter the formal procedure at the college level.

The student will meet with the associate dean, who will attempt to resolve the issue by working with the department/program. Contact the associate dean at otp-mcnu-grad-education@northeastern.edu to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine if the complaint is substantive and there is just cause to convene the Academic Appeals Committee.

The student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean. The statement must be submitted no later than 10 calendar days from the day when the academic determination is made available to the student. The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint. Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the department/program director and convene a

meeting of the Academic Appeals Committee. If the student fails to provide a thoughtful and well-reasoned written summary of the case, then the matter will be considered closed at the college level.

The associate dean will make a good faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of their statement.

Appeals Meeting

The student has the right to attend and present their case orally to the committee. The student is not required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the committee may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. Lawyers are not permitted in these proceedings.

The student usually presents their complaint to the committee first. The committee may then ask the complainant questions based upon either the written case submitted by the complainant or the complainant's oral presentation. The committee then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the committee believes it cannot resolve any issues without additional information, the committee may request any information needed from either the complainant or department/program. This information must be provided to the committee within one week of the meeting. If the needed information is not provided in the time frame required, then the committee may weigh this failure in making its final determination regarding the original complaint.

Committee Process

- All decisions of the committee will be made based on a simple majority (51%) vote.
- The associate dean is chair of the committee and only votes when there is a tie.
- The student bringing the complaint to the committee carries the burden of proof based on the weight of the evidence in demonstrating that the dismissal is incorrect or unjustified.
- If the committee decides that the academic dismissal should be revoked, the committee can request that the department reinstate the student immediately.

Decisions concerning dismissals cannot be appealed beyond the college level. While program dismissals cannot be appealed beyond the college level, underlying academic judgments that led to a dismissal can be appealed.

Changes in Requirements

The continuing development of the college may result in regular revision of curricula. When curriculum changes are made, students are allowed to complete the degree requirements of the program when they matriculated. If a student wishes to follow the new curriculum/program, they may request this in writing via an email to the MCNU Dean's Office at the time of the announcement of said changes.

Continuity of Registration

Students are expected to maintain satisfactory progress toward their intended degrees. All students must be registered in the last semester of their program. A student who does not enroll for a period of three semesters, or one year, will be required to apply for readmission. Readmission is done via Slate. A student who does not enroll for a period of two semesters, or less than one year, may petition their department for reactivation. If the department is supportive, the student will be required to submit a written request to the departmental graduate committee. If the graduate committee feels the student is worthy of reactivation, the student's written request must be submitted to the MCNU Dean's Office. Please note that college admissions deadlines apply to requests for readmission and reactivation.

Course Registration and Advising

Students are encouraged to obtain advisor approval of course selections each semester. This approval is required for all assistantship recipients, and some departments require it for all students. Students should check with individual departments for specific guidelines.

Grading

In MCNU, not more than two courses or 6 semester hours of credit, whichever is greater, may be repeated to satisfy the requirements for the degree. Only such repeats will be counted in calculating the cumulative grade-point average.

No grade changes are permitted after the end of the final examination period one calendar year from the semester in which the student registered for the course. In calculating the overall cumulative average, all graduate-level coursework completed at the time of clearance for graduation will be counted, including other coursework completed for graduate certificates, master's degrees, doctoral programs, and personal interest or professional development.

Students cannot elect a satisfactory/unsatisfactory (pass/fail) grading scheme for MCNU courses, unless the course grading scheme is designated satisfactory/unsatisfactory (pass/fail).

Satisfactory Progress

Satisfactory progress means satisfying requirements in Mills College at Northeastern, in this graduate catalog, and in the regulations specified by the departments.

MCNU sets minimum standards for all students to fulfill. Departments and programs may have additional requirements that exceed those of MCNU. Students in MCNU must be making satisfactory progress, including working toward the graduation requirement of a grade-point average of 3.000 in their coursework and the timely completion of coursework and comprehensive/qualifying examinations. See also the university's policy on academic standing ("Minimum Cumulative GPA").

Student Complaints and Grievance Process

Introduction

This policy describes steps a graduate student should follow to submit a grievance.

Students should first attempt to resolve an issue through informal means, for example, by communicating with appropriate faculty members or the program director. If the issue is not resolved, students should follow the grievance procedure.

Students who believe that they have been erroneously, capriciously, inappropriately, or otherwise unfairly treated in an academic or cooperative education determination should follow the appeals procedure described in the Mills College at Northeastern University Graduate Appeals Policy. Subsequent academic appeals can be submitted by following the MCNU Academic Appeals Policy and Procedure.

If a student's grievance includes a claim of discriminatory acts prohibited by law or by university policy (<https://catalog.northeastern.edu/handbook/policies-regulations/equal-opportunity/>), the student should first submit the grievance to the Office for University Equity and Compliance (<https://ouec.northeastern.edu/>) for resolution through the applicable procedures. At the conclusion of the OUEC resolution process, any aspects of the grievance that remain unresolved may then be brought to the grievance procedure.

Graduate students can contact the Ombuds for Graduate Students (<https://graduateombuds.northeastern.edu/>) that offers confidential, impartial, and informal assistance to graduate students who have concerns related to their university experience.

Note that the college prohibits retaliation against a student for filing a grievance.

Grievance Procedure

A graduate student who would like to complain about their treatment by an MCNU employee (faculty or staff) may submit a grievance.

Step 1. A written description of the complaint should be submitted within 60 days of the alleged activity. The description should state the exact nature of the grievance, against whom it is filed, and the remedy sought.

Step 2. The student should submit the complaint to the faculty program lead (chair or unit head of the department or unit that houses the student's primary program of study) and to the associate dean for curriculum at otp-mcnu-grad-education@northeastern.edu. The program lead shall review the complaint, give any employees named in the grievance an opportunity to share relevant information, gather additional information as needed, and send a written response to the student and the associate dean within two weeks.

Step 3. If the student is not satisfied by the faculty lead's response, the student may resubmit the complaint to the associate dean for curriculum within two weeks. The associate dean shall review all available information and submit a written response to the student within two weeks.

Step 4. If the student is not satisfied by the associate dean's decision, the student may submit the complaint to the dean of MCNU within two weeks. The dean will review all available information and submit a written response to the student within two weeks.

Time Limitation

Refer to Northeastern University policy regarding time limitations. If students wish to apply for an extension of the time limit, they must submit a petition to their department of study. The petition must include a detailed plan for completion of all remaining degree requirements. In the case of master's degree time limit extension requests for coursework, the department must certify that the content of each of the courses has not changed since the time the student completed the course. If deemed appropriate, the department will recommend a time limit extension to the Office of the Dean. The dean has final approval of time limit extensions.

Early Childhood Education, MA (Oakland)

This program is designed to prepare our students to work as leaders in teaching or administration in early childhood settings, including preschools and child development programs. In addition, the program prepares students to teach early childhood education topics in community colleges or

adult education programs. Our students often continue their education to pursue research or doctoral degrees, as well as other forms of professional leadership. The program provides a strong foundation in child development and in developmentally, culturally, and linguistically responsive practices. The full-time MA programs can be pursued alongside the following teaching credentials: early childhood special education, multiple subject (for K–8 teaching), or educational leadership.

Special Education Credential

In combination with the early childhood education MA, this program prepares students to work in early intervention and preschool special education settings with infants and young children who have developmental disabilities. Graduates see that working with families, caregivers, and communities is integral to the education and care of young children with special needs. (See program details for specific information on the multiple subject and administrative services credentials.)

COURSEWORK

A total of 42 semester hours are required to earn the Master of Arts in Early Childhood Education with coursework leading to eligibility for the Special Education Credential. Coursework integrates theory and practice to prepare students to teach in urban settings and is guided by an overarching concern for social justice. All courses listed below, along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for the Preliminary Education Specialist, Early Childhood Special Education Credential, in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

FIELDWORK

The early childhood education department maintains the belief that coursework and fieldwork must be integrated. Therefore, courses have assignments requiring engagement in educational settings, and students are placed in experiential learning/educational fieldwork every semester of the two-year program. During a student's first year, they are placed at the Mills College Children's School, where they are closely mentored by experienced and knowledgeable early childhood professionals. Students participate in weekly reflective circles with team members, where they discuss instructional decisions and interventions, receive feedback, and identify the next steps for supporting children and families. During the second year, student teaching occurs in an early intervention setting and a preschool/kindergarten setting. In their field placements, students have an opportunity to demonstrate their understanding of effective early intervention and preschool special education. These experiential learning experiences total over 900 hours and therefore far exceed the 600 hours of fieldwork required by the state accrediting body, the California Commission on Teacher Credentialing. Throughout the course sequence of the ECSE program, students compile a digital portfolio, which includes course assignments such as reflection pieces, presentations, and papers. The portfolio provides evidence of varied experiences, depth of knowledge, and critical reflection around instruction gained during the program.

Program Requirements

Please note: All courses listed below (with the exception of Graduate Seminar: Research in Education 1 (EDUT 6210), Graduate Seminar: Research in Education 2 (EDUT 6211), Responsible AI (PHIL 5110), and AI in Education (EDUT 6150) , along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for the Preliminary Education Specialist, Early Childhood Special Education Credential, in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

Required Courses

Code	Title	Hours
Complete one of the two following sequences:		6-8
EDUT 6210 and EDUT 6211	Graduate Seminar: Research in Education 1 and Graduate Seminar: Research in Education 2	
PHIL 5110 and EDUT 6150	Responsible AI and AI in Education	
Complete at least two of the following (all four courses are required for the Concentration in Early Childhood Special Education concentration):		6-12
EDUT 6202	Children with Special Needs: Infants and Young Children	
EDUT 6203	Theory and Practice of Early Childhood Education 1: Infants, Toddlers, and Young Children	
EDUT 6204	Theory and Practice of Early Childhood Education 2: Infants, Toddlers, and Young Children	
EDUT 6213	Language Development: Literacy, Communication, and Multilingualism	

Concentration Options

Complete one of the following concentrations:

- Administrative Services (p. 1343)
- Early Childhood Special Education (p. 1343)
- Multiple Subject Education (p. 1343)

Program Credit/GPA Requirements

39 minimum semester hours required (total semester hours may vary based on the course options the student chooses)

Minimum 3.000 GPA required

CONCENTRATION IN ADMINISTRATIVE SERVICES

Coursework that prepares students for the **Administrative Services Credential** is listed below:

Code	Title	Hours
EDUT 6300	School Law and Public Policy	3
EDUT 6301	Instructional Leadership	4
EDUT 6302	Field Experience 1: Educational Leadership	2
EDUT 6303	Field Experience 2: Educational Leadership	2
EDUT 6304	Working with Families and the Community	3
EDUT 6305	Human Resource Management in Education	4
EDUT 6306	School Leadership	4
EDUT 6307	Fiscal and Business Services	4
EDUT 6308	Trauma-Informed Leadership	4

CONCENTRATION IN EARLY CHILDHOOD SPECIAL EDUCATION

Coursework that prepares students for the **Special Education Credential** is listed below:

Code	Title	Hours
EDUT 6200	Cultivating Critical Consciousness in Practice	3
EDUT 6201	Legal Aspects and Program Design of Special Education	3
EDUT 6202	Children with Special Needs: Infants and Young Children	3
EDUT 6203	Theory and Practice of Early Childhood Education 1: Infants, Toddlers, and Young Children	3
EDUT 6204	Theory and Practice of Early Childhood Education 2: Infants, Toddlers, and Young Children	3
EDUT 6205	Family Systems and Cultural Diversity	3
EDUT 6206	Assessment and Intervention for Children with Special Needs	3
EDUT 6207	Positive Behavior Support and Intervention	3
EDUT 6208	Field Experience in Early Childhood Special Education 1	3
EDUT 6209	Field Experience in Early Childhood Special Education 2	3
EDUT 6212	Leadership and Administration in Early Childhood Programs	3
EDUT 6213	Language Development: Literacy, Communication, and Multilingualism	3

CONCENTRATION IN MULTIPLE SUBJECT EDUCATION

Coursework that prepares students for the **Multiple Subject Teaching Credential** is listed below:

Code	Title	Hours
EDUT 6100	Sociopolitical Foundations 1	2
EDUT 6101	Sociopolitical Foundations 2	1
EDUT 6102	Sociopolitical Foundations 3	1
EDUT 6103	Human and Community Development 1	2
EDUT 6104	Human and Community Development 2	1
EDUT 6106	Multiliteracies 1—Multidiscipline	2
EDUT 6107	Multiliteracies 2—Multiple Subjects	1
EDUT 6112	Methodologies of English-Language Development and Content Instruction 1	2
EDUT 6115	Curriculum and Instruction 1—Multiple Subjects	2
EDUT 6116	Curriculum and Instruction 2—Multiple Subjects	2
EDUT 6117	Curriculum and Instruction 3—Multiple Subjects	2
EDUT 6124	Pedagogical Content Knowledge Lab 1—Multiple Subjects	2
EDUT 6125	Pedagogical Content Knowledge Lab 2—Multiple Subjects	3

EDUT 6126	Pedagogical Content Knowledge Lab 3—Multiple Subjects	3
EDUT 6136	Perspectives on Diversity, Equity, and Assessment	2

Educational Leadership, MA (Oakland)

This program is designed to prepare students for leadership positions in public educational institutions and emphasizes developmental and constructivist approaches to education. School leaders have an opportunity to test theory in practice, anticipate consequences, and evaluate outcomes in a wide range of educational settings. Graduates have a strong record of becoming successful school administrators and leaders in educational transformation. The Administrative Services Credential can be earned with the Master of Arts in Educational Leadership.

Administrative Services Credential

The Master of Arts in Educational Leadership includes coursework conducive to the Administrative Services Credential and prepares students for positions as administrators in K–12 public schools in the state of California. The ASC is required for administrative roles in all K–12 public schools in California; for example, the ASC is required for principals, assistant principals, superintendents, curriculum directors, and all other school administrator positions in all public schools across the state.

This credential program emphasizes both developmental and constructivist approaches to education. School leaders test theory in practice, anticipate consequences, and evaluate outcomes in a wide range of educational settings. Graduates have a strong record of becoming successful school administrators and leaders in educational transformation and school leadership. Graduates of the program are employed in 21 Bay Area school districts, including those in Alameda, Contra Costa, Sacramento, San Francisco, San Mateo, and Santa Clara counties. After completing courses required for the ASC, program graduates work with a commission-approved administrative services induction program to obtain a recommendation for the Clear Administrative Services Credential.

COURSEWORK

A total of 30 semester hours are required to earn the Master of Arts in Educational Leadership with the Administrative Services Credential. All courses offered through the educational leadership program may be applied to the MA, and the course of study will be determined by a student in partnership with their Mills College at Northeastern University faculty advisor. In most cases, it is possible to tailor the MA to an individual candidate's interests and specific career goals. All courses listed below, along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for the five-year preliminary Administrative Services Credential in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

FIELDWORK

The program values the students' ability to perform well and the rigor of their research. However, the real test of a novice administrator is at the school site, where they may use their growing knowledge and skills in a leadership capacity. Students are assigned mentor principals and field supervisors who support their leadership growth through reflective conversations, advice, and by modeling appropriate practice.

Program Requirements

Please note: All courses listed below, along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for the five-year preliminary Administrative Services Credential in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

Required Courses

Code	Title	Hours
EDUT 6300	School Law and Public Policy	3
EDUT 6301	Instructional Leadership	4
EDUT 6302	Field Experience 1: Educational Leadership	2
EDUT 6303	Field Experience 2: Educational Leadership	2
EDUT 6304	Working with Families and the Community	3
EDUT 6305	Human Resource Management in Education	4
EDUT 6306	School Leadership	4
EDUT 6307	Fiscal and Business Services	4
EDUT 6308	Trauma-Informed Leadership	4

Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

Multiple Subject Education, MA (Oakland)

The Master of Arts in Multiple Subject Education is an Educators for Liberation, Justice, and Joy program administered by the Mills College at Northeastern University's School of Education in Oakland, California. This program aims to meet the urgent need for elementary schoolteachers whose teaching embodies racial and gender justice for educational equity principles, guided by an inquiry stance toward practice. The program offers beginning teachers an opportunity to obtain the skills and meet the requirements for a California Preliminary Multiple Subject Teaching Credential while completing classroom research. Students may follow either a preservice or an internship pathway toward the credential and subsequent MA.

Multiple Subject Teaching Credential

All courses in the program (with the exception of [EDUT 6210 Graduate Seminar: Research in Education 1](#), [EDUT 6211 Graduate Seminar: Research in Education 2](#), [EDUT 6150 AI in Education](#), and [PHIL 5110 Responsible AI](#)), along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for the Preliminary Multiple Subject Teaching Credential in the state of California. **The final authority to grant a credential lies with the Commission on Teacher Credentialing.**

COURSEWORK

A total of 37 semester hours are required to earn the Master of Arts in Multiple Subject Education. The coursework in the program is designed to satisfy both the requirements of the California teaching credential and lay the foundation for the MA in Multiple Subject Education. With the addition of two inquiry-oriented master's-level courses over the following academic year and the completion of their inquiry project, students will earn their Master of Arts degree.

FIELDWORK

All students are paired with a university-appointed coaching supervisor who provides guidance and feedback on their curriculum and pedagogy through a minimum of 12 observations during the school year, which must adhere to the six principles of the Teacher Performance Expectations as outlined by the California Commission on Teacher Credentialing. The successful completion of the ELJJ coursework, fieldwork, standardized exams, portfolio assessment, and all other requirements outlined by the CCTC will result in a recommendation from the ELJJ to the CCTC for a Preliminary Multiple Subject Teaching Credential. This will allow the graduate to teach in their discipline-specified area in a public school in the state of California. Through the National Association of State Directors of Teacher Education and Certification Interstate Agreement, credential holders of valid teaching state credentials, licenses, or certificates from a participating state may transfer these to another participating state, under certain conditions that must be confirmed by the receiving state's education department.

Program Requirements

Please note: All courses listed below (with the exception of [EDUT 6210 Graduate Seminar: Research in Education 1](#), [EDUT 6211 Graduate Seminar: Research in Education 2](#), [EDUT 6150 AI in Education](#), and [PHIL 5110 Responsible AI](#)), along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for the Preliminary Multiple Subject Teaching Credential in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

Required Courses

Code	Title	Hours
EDUT 6100	Sociopolitical Foundations 1	2
EDUT 6101	Sociopolitical Foundations 2	1
EDUT 6102	Sociopolitical Foundations 3	1
EDUT 6103	Human and Community Development 1	2
EDUT 6104	Human and Community Development 2	1
EDUT 6106	Multiliteracies 1—Multidiscipline	2
EDUT 6107	Multiliteracies 2—Multiple Subjects	1
EDUT 6108	Multiliteracies 3—Multiple Subjects	2
EDUT 6112	Methodologies of English-Language Development and Content Instruction 1	2
EDUT 6113	Methodologies of English-Language Development and Content Instruction 2	1
EDUT 6115	Curriculum and Instruction 1—Multiple Subjects	2
EDUT 6116	Curriculum and Instruction 2—Multiple Subjects	2
EDUT 6117	Curriculum and Instruction 3—Multiple Subjects	2
EDUT 6124	Pedagogical Content Knowledge Lab 1—Multiple Subjects	2
EDUT 6125	Pedagogical Content Knowledge Lab 2—Multiple Subjects	3
EDUT 6126	Pedagogical Content Knowledge Lab 3—Multiple Subjects	3
EDUT 6136	Perspectives on Diversity, Equity, and Assessment	2
Complete one of the following two-course sequences:		6-8
EDUT 6210 and EDUT 6211	Graduate Seminar: Research in Education 1 and Graduate Seminar: Research in Education 2	

Program Credit/GPA Requirements

37 minimum semester hours required (total semester hours may vary based on the course options that the student chooses)

Minimum 3.000 GPA required

Single Subject Education, MA (Oakland)

The Educators for Liberation, Justice, and Joy program is designed to prepare graduate students to teach art, English, social science, Spanish or French, science, technology, engineering, or mathematics while earning their California Single Subject Teaching Credential and Master of Arts degree. The ELJJ program centers on racial and gender justice for educational equity and access. The program is designed around praxis as the core endeavor of teaching and teacher education, embracing critical reflection and practice to disrupt dominant ideologies and inequities. We utilize a cognitive apprenticeship model that combines coaching and inquiry and situates teacher learning within a school-based classroom. The program relies on an interdisciplinary, cross-grade, cohort community model that builds on the strengths of sociocultural learning theory. We believe that teachers must attend to the positive development of the whole child by successfully integrating culturally relevant and sustaining pedagogy, critical pedagogy, humanizing education, academic rigor, creative expression, and joy.

All courses in the program (with the exception of EDUT 6210 Graduate Seminar: Research in Education 1, EDUT 6211 Graduate Seminar: Research in Education 2, EDUT 6150 AI in Education, and PHIL 5110 Responsible AI), along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for a Preliminary Single Subject Teaching Credential in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

Coursework

A total of 36 semester hours are required to earn the Master of Arts in Single Subject Education. The coursework outlined in the program is designed to satisfy both the requirements of the California teaching credential and lay the foundation for the Master of Arts in Single Subject Education. With the addition of two inquiry-oriented master's-level courses over the following academic year and the completion of their inquiry project, students will earn their Master of Arts degree.

FOCUS AREAS

The coursework in the Single Subject (Humanities) focus area prepares students to teach art, English, social science, or Spanish or French as a foreign language.

The coursework in the Single Subject (Math/Science) focus area prepares students to teach science, technology, engineering, and mathematics in grades 6–12, particularly in urban public schools.

FIELDWORK

All students are paired with a university-appointed coaching supervisor who provides guidance and feedback on their curriculum and pedagogy through a minimum of 12 observations during the school year, which must adhere to the six principles of the Teacher Performance Expectations as outlined by the California Commission on Teacher Credentialing. The successful completion of the ELJJ coursework, fieldwork, standardized exams, portfolio assessment, and all other requirements outlined by the CCTC will result in a recommendation from the ELJJ to the CCTC for a Preliminary Single Subject Teaching Credential. This will allow the graduate to teach in their discipline-specified area in a public school in the state of California. Through the National Association of State Directors of Teacher Education and Certification Interstate Agreement, credential holders of valid teaching state credentials, licenses, or certificates from a participating state may transfer these to another participating state, under certain conditions that must be confirmed by the receiving state's education department.

Program Requirements

Please note: All courses listed below (with the exception of EDUT 6210 Graduate Seminar: Research in Education 1, EDUT 6211 Graduate Seminar: Research in Education 2, EDUT 6150 AI in Education, and PHIL 5110 Responsible AI), along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for a Preliminary Single Subject Teaching Credential in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

Required Courses

Code	Title	Hours
EDUT 6100	Sociopolitical Foundations 1	2
EDUT 6101	Sociopolitical Foundations 2	1
EDUT 6102	Sociopolitical Foundations 3	1
EDUT 6103	Human and Community Development 1	2
EDUT 6104	Human and Community Development 2	1
EDUT 6109	Multiliteracies 1—Single Subject	2

EDUT 6110	Multiliteracies 2—Single Subject	1
EDUT 6112	Methodologies of English-Language Development and Content Instruction 1	2
EDUT 6113	Methodologies of English-Language Development and Content Instruction 2	1
EDUT 6127	Pedagogical Content Knowledge Lab 1—Single Subject	2
EDUT 6128	Pedagogical Content Knowledge Lab 2—Single Subject	3
EDUT 6129	Pedagogical Content Knowledge Lab 3—Single Subject	3
EDUT 6136	Perspectives on Diversity, Equity, and Assessment	2
Complete one of the following two-course sequences:		6-8
EDUT 6210 and EDUT 6211	Graduate Seminar: Research in Education 1 and Graduate Seminar: Research in Education 2	
PHIL 5110 and EDUT 6150	Responsible AI and AI in Education	

Complete one of the following focus areas:

- Single Subject (Humanities) (p. 1347)
- Single Subject (Math/Science) (p. 1347)

Program Credit/GPA Requirements

36 minimum semester hours required (total semester hours may vary based on the course options the student chooses)

Minimum 3.000 GPA required

SINGLE SUBJECT (HUMANITIES) FOCUS AREA

Code	Title	Hours
EDUT 6118	Curriculum and Instruction 1—Single Subject, Humanities	2
EDUT 6119	Curriculum and Instruction 2—Single Subject, Humanities	2
EDUT 6120	Curriculum and Instruction 3—Single Subject, Humanities	2
EDUT 6130	Survey of Humanities in Secondary Schools—Single Subject	1

SINGLE SUBJECT (MATH/SCIENCE) FOCUS AREA

Code	Title	Hours
EDUT 6121	Curriculum and Instruction 1—Single Subject, Math/Science	2
EDUT 6122	Curriculum and Instruction 2—Single Subject, Math/Science	2
EDUT 6123	Curriculum and Instruction 3—Single Subject, Math/Science	2
EDUT 6133	Survey of STEM—Single Subject	1

AI Applications, Graduate Certificate (Boston)

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- College of Social Sciences and Humanities

- D'Amore-McKim School of Business
- Mills College at Northeastern

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

Experiential Courses

Code	Title	Hours
Complete 4 semester hours from the following:		4
CRIM 6600	Justice, Technology, and AI	
EDUT 6150	AI in Education	
HLTH 5800	AI Across the Health Sciences	
IE 5640	Data Mining for Engineering Applications	
JRNL 6460	AI in Media Industries	
MISM 6250	Strategic AI for Business	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Gordon Institute of Engineering Leadership

Website (<https://gordon.northeastern.edu/>)

Simon Pitts

Director and Head—Gordon Institute of Engineering Leadership

415 Stearns Center

617.373.4800

617.373.7680 (fax)

The Gordon Institute of Engineering Leadership offers a graduate certificate that pairs with over 20 master's programs in the College of Engineering, College of Science, and Khoury College of Computer Sciences. The Gordon program is a transformational graduate program designed to build a future corps of engineering leadership professionals. GIEL seeks to accelerate leadership development capability in an engineering context through a concentrated curriculum that inculcates both the psychological skills and capabilities needed to lead engineers in parallel with technical skills to successfully engineer products to customers and markets. The program teaches relevant leadership theory followed by practice in leadership laboratories. Technical product development and scientific principles courses are followed by the completion of a market-worthy challenge project. This learning framework is supplemented with three-way mentoring from industry, faculty, and program mentors. Graduates of the program, known as Gordon Fellows, have an opportunity to gain the knowledge, skills, and attitudes required to successfully lead engineering teams. They stand out from their peers in their ability to invent, innovate, and implement engineering projects from concept to market success. Participation in GIEL accelerates Gordon Fellows' careers, making them more valuable to their company.

The Challenge

When relatively unseasoned engineers run teams or projects, most fail to satisfy all of the project's critical requirements—missing the mark in functionality, performance, quality, time-to-market, cost, or other key objectives.

This shortfall exists because engineers enter the workforce without critical skills related to:

- Competitiveness
- Taking responsibility to prevent failure
- Market and customer focus
- Influencing and motivating skills
- Interdisciplinary decision-making and teamwork capability
- Simultaneous optimization of all elements of performance, quality, cost, and timing
- Front-loading the engineering process
- Financial acumen
- Big-picture engineering
- Leadership abilities and organizational social awareness
- Enterprise understanding
- Program management tools and processes
- Designing to avoid failure modes
- Designing for lean manufacture

The Mission

GIEL's mission is to create an elite cadre of engineering leaders who stand out from their peers in their ability to invent, innovate, and implement engineering projects from concept to market success.

These leaders will demonstrate an exceptional ability to lead engineering teams by providing purpose, direction, and motivation to influence others to achieve their collective goals.

The Method

To close the gaps and realize its mission, GIEL concentrates on the knowledge, skills, and abilities that reside at the intersection of engineering and leadership.

At the end of the program, Gordon Fellows emerge with the awareness, confidence, vision, and technical dexterity to drive positive change within their organizations and society.

Admissions

GIEL candidates must apply for and be admitted to both the Northeastern University Graduate School of Engineering and the Gordon Institute of Engineering Leadership.

Students pursue GIEL as part of a Master of Science degree in the engineering discipline of their choice or as a stand-alone graduate certificate. Upon completion of a Master of Science degree, students earn both the Master of Science degree in the discipline of choice and a Graduate Certificate in Engineering Leadership. Students who already hold a graduate degree in engineering or have greater than three years of engineering work experience can complete the program to earn a Graduate Certificate in Engineering Leadership. The core GIEL curriculum takes place during one calendar year (September–July), and additional coursework required for the Master of Science degree can be pursued before, after, or in parallel with GIEL.

Programs

Graduate Certificates

- Engineering Leadership (p. 738) (Boston)
- Technology Leadership (p. 1352) (Boston)

Engineering Leadership, Graduate Certificate (Boston)

The Gordon Engineering Leadership Program is a transformational, technical, and challenging graduate-level learning experience targeted for engineering professionals.

The Gordon Engineering Leadership Program directed by the Gordon Institute of Engineering Leadership offers a graduate certificate that pairs with over 25 master's degrees in the College of Engineering, College of Science, and Khoury College of Computer Sciences. The Gordon Program is a transformational graduate program designed to build a future corps of engineering leadership professionals.

Pursuing the graduate certificate allows participants to:

- Take part in a hands-on curriculum taught by industry-experienced professors
- Work with peers from across engineering fields on leadership skills development
- Receive one-on-one mentoring from industry experts and faculty

The Gordon Engineering Leadership Program anchors around an intense, market-worthy challenge project based on your organization's strategic needs. This is a unique opportunity to apply your classroom experience in a professional setting, potentially further accelerating your career.

How to Earn a Graduate Certificate in Engineering Leadership

If you already have a Master of Science, then you can complete the one-year program to earn a Graduate Certificate in Engineering Leadership.

If you do not have a Master of Science, then you can still be considered for the Graduate Certificate in Engineering Leadership if you have at least three years of engineering work experience.

Additional information can be found on the Gordon Engineering Leadership Program website. (<https://gordon.northeastern.edu>)

Beyond a Graduate Certificate

Most candidates pursue the Gordon Engineering Leadership Program as part of a Master of Science degree in the engineering discipline of their choice. Upon completion, they earn both a Master of Science degree and a Graduate Certificate in Engineering Leadership.

Students can enroll in the Engineering Leadership Graduate Certificate while pursuing the following degrees:

- MS Advanced and Intelligent Manufacturing (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/advanced-and-intelligent-manufacturing/>)
- MS Biotechnology (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-science/ms-in-biotechnology/>)
- MS Climate Science and Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/climate-science/>)
- MS Computer Science (<https://gordon.northeastern.edu/certificate-and-degree-options/khoury-college-of-computer-sciences/computer-science/>)
- MS Cybersecurity (<https://gordon.northeastern.edu/certificate-and-degree-options/khoury-college-of-computer-sciences/ms-in-information-assurance-and-cyber-security/>)
- MS Data Analytics Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-data-analytics-engineering/>)
- MS Engineering and Public Policy (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-engineering-and-public-policy/>)
- MS Human Factors (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/human-factors/>)
- MS Robotics (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/robotics/>)
- MS Telecommunication Networks (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-telecommunication-networks/>)
- MSBioE Bioengineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-bioengineering/>)
- MSChE Chemical Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/chemical-engineering/>)
- MSCivE Civil Engineering (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-civil-engineering/>)
- MSCSE Software Engineering Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-computer-systems-engineering/>)
- MSECE Electrical and Computer Engineering (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-electrical-and-computer-engineering/>)
- MSECLEL Electrical and Computer Engineering Leadership (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-electrical-and-computer-engineering-leadership/>)
- MSEM Engineering Management (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-engineering-management/>)

- MSEN Energy Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-energy-systems/>)
- MSENvE Environmental Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-environmental-engineering/>)
- MSIE Industrial Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-industrial-engineering/>)
- MSIS Information Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-information-systems/>)
- MSME Mechanical Engineering (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-mechanical-engineering/>)
- MSOR Operations Research (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-operations-research/>)
- MSSBS Sustainable Building Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-sustainable-building-systems/>)

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
ENLR 5121	Engineering Leadership 1	2
ENLR 5122	Engineering Leadership 2	2
ENLR 5131	Scientific Foundations of Engineering 1	2
ENLR 5132	Scientific Foundations of Engineering 2	2
Complete the following two courses based on the discipline of your master's program:		
ENLR 7440	Engineering Leadership Challenge Project 1	4
or EECE 7440	Electrical and Computer Engineering Leadership Challenge Project 1	
or ENSY 7440	Energy Systems Engineering Leadership Challenge Project 1	
or IE 7440	Industrial Engineering Leadership Challenge Project 1	
or ME 7440	Mechanical Engineering Leadership Challenge Project 1	
or TELR 7440	Technology Leadership Challenge Project 1	
ENLR 7442	Engineering Leadership Challenge Project 2	4
or EECE 7442	Electrical and Computer Engineering Leadership Challenge Project 2	
or ENSY 7442	Energy Systems Engineering Leadership Challenge Project 2	
or IE 7442	Industrial Engineering Leadership Challenge Project 2	
or ME 7442	Mechanical Engineering Leadership Challenge Project 2	
or TELR 7442	Technology Leadership Challenge Project 2	

Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

Technology Leadership, Graduate Certificate (Boston)

The Graduate Certificate in Technology Leadership offered by the Gordon Institute of Engineering Leadership (GIEL) is a transformational graduate program designed to build a future corps of technology leadership professionals. GIEL seeks to accelerate leadership development capability in a technical context through a concentrated curriculum that inculcates both the psychological skills and capabilities needed to lead in parallel with technical skills to successfully release products to customers and markets. The program teaches relevant leadership theory followed by practice in leadership laboratories. Technical product development and scientific principles courses are followed by the completion of a market-worthy challenge project. This learning framework is supplemented with three-way mentoring from industry, faculty, and program mentors. Graduates of the program, known as Gordon Fellows, have an opportunity to gain the knowledge, skills, and attitudes required to successfully lead technical teams. They stand out from their peers in their ability to invent, innovate, and implement technology projects from concept to market success. Participation in GIEL accelerates Gordon Fellows' careers, making them more valuable to their company.

The Challenge

When relatively unseasoned professionals run teams or projects, most fail to satisfy all of the project's critical requirements—missing the mark in functionality, performance, quality, time-to-market, cost, or other key objectives.

This shortfall exists because professionals enter the workforce without critical skills related to:

- Competitiveness

- Taking responsibility to prevent failure
- Market and customer focus
- Influencing and motivating skills
- Interdisciplinary decision making and teamwork capability
- Simultaneous optimization of all elements of performance, quality, cost, and timing
- Front-loading the technology delivery process
- Financial acumen
- Big-picture engineering
- Leadership abilities and organizational social awareness
- Enterprise understanding
- Program management tools and processes
- Designing to avoid failure modes
- Designing for lean manufacture

The Mission

GIEL's mission is to create an elite cadre of technology leaders who stand out from their peers in their ability to invent, innovate, and implement technical projects from concept to market success.

These leaders will demonstrate an exceptional ability to lead teams by providing purpose, direction, and motivation to influence others to achieve their collective goals.

The Method

To close the gaps and realize its mission, GIEL concentrates on the knowledge, skills, and abilities that reside at the intersection of technology and leadership.

At the end of the program, Gordon Fellows emerge with the awareness, confidence, vision, and technical dexterity to drive positive change within their organizations and society.

Admissions

Candidates must apply for and be admitted to both a master's degree program at Northeastern and the Graduate Certificate in Technology Leadership.

Students pursue the Graduate Certificate in Technology Leadership as part of a master's degree or as a stand-alone graduate certificate. Upon completion of a Master of Science degree, students earn both the Master of Science degree in the discipline of choice and a Graduate Certificate in Technology Leadership. Students who already hold a graduate degree or have greater than three years' industry work experience can complete the program to earn a stand-alone Graduate Certificate in Technology Leadership. The core GIEL curriculum takes place during one calendar year (September–July), and additional coursework required for the Master of Science degree can be pursued before, after, or in parallel with GIEL.

For more information contact Amy Manley, Director of Admissions and Marketing, (617) 373-4800 or a.manley@northeastern.edu.

Program Requirements

Code	Title	Hours
TELR 5121	Technology Leadership 1	2
TELR 5122	Technology Leadership 2	2
TELR 5131	Scientific Foundations of Technology 1	2
TELR 5132	Scientific Foundations of Technology 2	2
TELR 7440	Technology Leadership Challenge Project 1	4
TELR 7442	Technology Leadership Challenge Project 2	4

¹ The Scientific Foundations of Technology 1 (TELR 5131) and Scientific Foundations of Technology 2 (TELR 5132) requirements may be met by completion of another course upon approval of the program director.

Program Credit/GPA Requirements

16 total semester hours required

1354 Technology Leadership, Graduate Certificate (Boston)

Minimum 3.000 GPA required

Additional Programs

- Professional Studies, DPS (Boston) (p. 1356)
- Applied AI, MPS (Boston) (p. 1357)
- Applied AI—Connect, MPS (Boston) (p. 1359)
- Global Doctoral Research, Graduate Certificate (Boston) (p. 1361)
- Organizational Communication, Graduate Certificate—Online (p. 1361)
- Postsecondary Teaching, Graduate Certificate (Boston) (p. 1362)
- Project Management, Graduate Certificate—Online (p. 1362)

Professional Studies, DPS (Boston)

The Doctor of Professional Studies offers learners from diverse disciplines an opportunity to obtain the knowledge, skills, and confidence to utilize research skill sets, interdisciplinary theoretical frameworks, and a professional knowledge base to create, implement, and communicate solutions to complex problems of practice in their local, professional context.

The DPS degree program is structured to accommodate a wide range of learners from the practitioner community, including working professionals from the public and private sectors (national, state, local) and from broad and professionally diverse backgrounds. Learners explore areas such as project management and leadership, positioning them for success in higher education or in other industries where doctoral degrees are valued.

The DPS program is structured so coursework and the doctoral thesis can be completed in two to three years. Classes are delivered online with biannual Boston residencies.

For the 2025–2026 academic year, the Doctor of Professional Studies program is being offered as a collaboration between the College of Professional Studies and the Office of the Provost. During this period, students will follow Northeastern University's Graduate Academic Calendar and be governed by the academic policies and procedures documented in the university's Graduate Catalog (p. 87).

During the time a student is designated under the Office of the Provost, the College of Professional Studies will provide each student with full academic and student support services (e.g., academic advising services, co-op and career advising services, International Tutoring Center, etc.).

Beginning in the 2026–2027 academic year, students enrolled in the Doctor of Professional Studies program will transition to the College of Professional Studies, and their official college designation will be updated accordingly in the academic system of record. At that time, students will be governed by the academic policies and procedures documented in the university's Graduate Catalog (p. 986), specifically relating to the College of Professional Studies.

Program Requirements

Required Core Courses

Code	Title	Hours
PST 7700	Introduction to Doctoral Studies	3
PST 7710	Thought Leadership, Innovation, Leading Change, and Policy	3
PST 7720	Introduction to Research and Research Design	3
PST 7730	Data Analysis for Professionals: Visualization and Interpretation	3
PST 7740	Advanced Applied Research Methods	3

Restricted Electives

Complete 6 semester hours from the following:		6
EDU 7461	Data-Driven Decision Making for Workplace Learning	
EDU 7505	Writing a Publishable Article	
LWP 6400	The Policy Making Process	
LWP 6449	Public Policy Inquiry and Investigation	
PST 7750	Product Development, Innovation, and Entrepreneurship	
PST 7755	Advanced Quantitative Methods	
PST 7983	Topics	

Dissertation Courses

Code	Title	Hours
Complete the following course three times:		12
PST 7760	Dissertation Development, Research and Analysis, Presentation, and Discussion	

Concentrations

Complete one of the following concentrations:

- Organizational Leadership (p. 1357)
- Project Management (p. 1357)

Program Credit/GPA Requirements

45 total semester hours required

Minimum 3.000 GPA required

Concentration in Organizational Leadership

Code	Title	Hours
LDR 7100	Advanced Leadership Theory, Coaching, and Development Techniques	3
LDR 7110	Advanced Organizational Behavior	3
LDR 7120	Global Leadership and Cultural Awareness	3
LDR 7130	Emerging Technologies in Organizational Leadership	3

Concentration in Project Management

Code	Title	Hours
LDR 7120	Global Leadership and Cultural Awareness	3
PJM 7100	Advanced Project Management Techniques and Methodologies	3
PJM 7110	Strategic Program and Project Portfolio Management	3
PJM 7130	Emerging Technologies in Project Management	3

Applied AI, MPS (Boston)

Humankind is on the threshold of a new era—an age of artificial intelligence as revolutionary in its global impact as the Industrial Revolution. The Master of Professional Studies in Applied AI program offers working professionals operational immersion and firsthand experiences with an end-to-end AI education that aims to prepare students proactively and thoughtfully for the evolving technology landscape and its challenges. The curriculum focuses on building and implementing AI and machine learning technologies, specializing in conversational AI, machine learning for cybersecurity, 3D imaging, and various electives. This comprehensive approach ensures that students are equipped with the skills and knowledge needed to stay ahead in the rapidly changing field of AI.

For the 2025–2026 academic year, the MPS Applied AI program is being offered as a collaboration between the College of Professional Studies and the Office of the Provost. During this period, students will follow Northeastern University's Graduate Academic Calendar and be governed by the academic policies and procedures documented in the university's Graduate Catalog (p. 87).

During the time a student is designated under the Office of the Provost, the College of Professional Studies will provide each student with full academic and student support services (e.g., academic advising services, co-op and career advising services, International Tutoring Center, etc.).

Beginning in the 2026–2027 academic year, students enrolled in the MPS Applied AI program will transition to the College of Professional Studies, and their official college designation will be updated accordingly in the academic system of record. At that time, students will be governed by the academic policies and procedures documented in the university's Graduate Catalog (p. 986), specifically relating to the College of Professional Studies.

Program Requirements

Core Courses

Code	Title	Hours
Complete the following:		
AAI 6600	Applied Artificial Intelligence	3
AAI 6610	Applied Machine Learning	3
AAI 6620	Applied Natural Language Processing	3
AAI 6630	Applied Computer Vision	3

Restricted Electives

Complete six semester hours from the following:		6
AAI 6640	Applied Deep Learning	
AAI 6650	Recommender System	
AAI 6655	Prompt Engineering	
AAI 6665	Generative Artificial Intelligence	
AAI 6740	Applied Reinforcement Learning	
AAI 6790	Applied Quantum AI	
AAI 6850	Applied Blockchain AI	
AAI 6900	AI for Autonomous Systems	
AAI 6983	Special Research Topics in AI	

Capstone

AAI 6980	Integrated Experiential Capstone	4

Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- AI for 3D Imaging (p. 1358)
- Conversational AI and Chatbots (p. 1358)
- Machine Learning for Cybersecurity (p. 1358)
- Electives Option (p. 1359)

Program Credit/GPA Requirements

34 total semester hours required

Minimum 3.000 GPA required

AI FOR 3D IMAGING CONCENTRATION

Code	Title	Hours
Complete the following:		
AAI 6710	Graph Signal Processing	3
AAI 6720	Graph Neural Networks	3
AAI 6730	Deep Learning for 3D Point Cloud Analysis	3
Complete one of the following:		3
AAI 6640	Applied Deep Learning	
AAI 6650	Recommender System	
AAI 6665	Generative Artificial Intelligence	
AAI 6740	Applied Reinforcement Learning	
AAI 6790	Applied Quantum AI	
AAI 6850	Applied Blockchain AI	
AAI 6900	AI for Autonomous Systems	

CONVERSATIONAL AI AND CHATBOTS CONCENTRATION

Code	Title	Hours
Complete the following:		
AAI 6660	Chatbot Architecture	3
AAI 6670	Chatbot Application	3
Complete two of the following		6
AAI 6640	Applied Deep Learning	
AAI 6650	Recommender System	
AAI 6655	Prompt Engineering	
AAI 6665	Generative Artificial Intelligence	
AAI 6740	Applied Reinforcement Learning	
AAI 6790	Applied Quantum AI	
AAI 6850	Applied Blockchain AI	
AAI 6900	AI for Autonomous Systems	

MACHINE LEARNING FOR CYBERSECURITY CONCENTRATION

Code	Title	Hours
Complete the following:		
AAI 6680	AI for Cybersecurity	3
AAI 6690	Machine Learning for Cyberdetection	3
Complete two of the following:		6
AAI 6640	Applied Deep Learning	
AAI 6650	Recommender System	
AAI 6665	Generative Artificial Intelligence	
AAI 6740	Applied Reinforcement Learning	
AAI 6790	Applied Quantum AI	

AAI 6850	Applied Blockchain AI
AAI 6900	AI for Autonomous Systems

ELECTIVES OPTION

Code	Title	Hours
Complete any College of Professional Studies graduate-level courses, unused courses in this program, or a combination of both in lieu of a concentration to meet total program required semester hours.		

Applied AI—Connect, MPS (Boston)

The Master of Professional Studies in Applied AI—Connect program is designed for students without prior experience in engineering, computer technology, or statistics. The program requires an additional 9 semester hours of coursework that provide the intensive, hands-on instruction necessary for students considering a career change to artificial intelligence, connecting the student's current background to artificial intelligence applications.

For the 2025–2026 academic year, the MPS Applied AI—Connect program is being offered as a collaboration between the College of Professional Studies and the Office of the Provost. During this period, students will follow Northeastern University's Graduate Academic Calendar and be governed by the academic policies and procedures documented in the university's Graduate Catalog (p. 87).

During the time a student is designated under the Office of the Provost, the College of Professional Studies will provide each student with full academic and student support services (e.g., academic advising services, co-op and career advising services, International Tutoring Center, etc.).

Beginning in the 2026–2027 academic year, students enrolled in the MPS Applied AI—Connect program will transition to the College of Professional Studies, and their official college designation will be updated accordingly in the academic system of record. At that time, students will be governed by the academic policies and procedures documented in the university's Graduate Catalog (p. 986), specifically relating to the College of Professional Studies.

Program Requirements**Connect Courses**

Code	Title	Hours
AAI 5015	Mathematical Concepts	3
AAI 5025	Python	3
AAI 5035	Research Methods and Scientific Writing	3

Core Courses

Code	Title	Hours
Complete the following:		
AAI 6600	Applied Artificial Intelligence	3
AAI 6610	Applied Machine Learning	3
AAI 6620	Applied Natural Language Processing	3
AAI 6630	Applied Computer Vision	3

Restricted Electives		6
AAI 6640	Applied Deep Learning	
AAI 6650	Recommender System	
AAI 6655	Prompt Engineering	
AAI 6665	Generative Artificial Intelligence	
AAI 6740	Applied Reinforcement Learning	
AAI 6790	Applied Quantum AI	
AAI 6850	Applied Blockchain AI	
AAI 6900	AI for Autonomous Systems	
AAI 6983	Special Research Topics in AI	

Capstone		
AAI 6980	Integrated Experiential Capstone	4

Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- AI for 3D Imaging (p. 1360)
- Conversational AI and Chatbots (p. 1360)

- Machine Learning for Cybersecurity (p. 1360)
- Electives Option (p. 1360)

Program Credit/GPA Requirements

43 total semester hours required

Minimum 3.000 GPA required

AI FOR 3D IMAGING CONCENTRATION

Code	Title	Hours
Complete the following:		
AAI 6710	Graph Signal Processing	3
AAI 6720	Graph Neural Networks	3
AAI 6730	Deep Learning for 3D Point Cloud Analysis	3
Complete one of the following:		3
AAI 6640	Applied Deep Learning	
AAI 6650	Recommender System	
AAI 6665	Generative Artificial Intelligence	
AAI 6740	Applied Reinforcement Learning	
AAI 6790	Applied Quantum AI	
AAI 6850	Applied Blockchain AI	
AAI 6900	AI for Autonomous Systems	

CONVERSATIONAL AI AND CHATBOTS CONCENTRATION

Code	Title	Hours
Complete the following:		
AAI 6660	Chatbot Architecture	3
AAI 6670	Chatbot Application	3
Complete two of the following:		6
AAI 6640	Applied Deep Learning	
AAI 6650	Recommender System	
AAI 6655	Prompt Engineering	
AAI 6665	Generative Artificial Intelligence	
AAI 6740	Applied Reinforcement Learning	
AAI 6790	Applied Quantum AI	
AAI 6850	Applied Blockchain AI	
AAI 6900	AI for Autonomous Systems	

MACHINE LEARNING FOR CYBERSECURITY CONCENTRATION

Code	Title	Hours
Complete the following:		
AAI 6680	AI for Cybersecurity	3
AAI 6690	Machine Learning for Cyberdetection	3
Complete two of the following:		6
AAI 6640	Applied Deep Learning	
AAI 6650	Recommender System	
AAI 6665	Generative Artificial Intelligence	
AAI 6740	Applied Reinforcement Learning	
AAI 6790	Applied Quantum AI	
AAI 6850	Applied Blockchain AI	
AAI 6900	AI for Autonomous Systems	

ELECTIVES OPTION

Code	Title	Hours
Complete any College of Professional Studies graduate-level courses, unused courses in this program, or a combination of both in lieu of a concentration to meet total program required semester hours.		

Global Doctoral Research, Graduate Certificate (Boston)

The Graduate Certificate in Global Doctoral Research is available to PhD students who are advised by Northeastern faculty or students enrolled in a PhD program at another institution who are co-advised by Northeastern faculty. The intent is to facilitate, encourage, and recognize the pedagogical and research benefits resulting from doctoral study in different cultural contexts. The intent is to guide students toward a set of globally meaningful education and research activities that infuse global values and perspectives into their research education.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Core Requirements

Code	Title	Hours
INPR 5900	Global and Intercultural Communication for Doctoral Students	2
INPR 7970	Global Research Integration	2

Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8
INPR 6200	Global Research Literacies	
INPR 7900	Global Research Experience	
INPR 7995	Global Experiential Project	

Any PhD-level course with an international component may be applied to fulfillment of this requirement with prior approval from the program advisor.

Additional Requirements

- All global doctoral research students must have dissertation committee members from at least two different locations and spend time in at least two locations doing research.
- Students enrolled in a PhD program at another institution must spend time at a Northeastern University location and have a Northeastern faculty member on their dissertation committee to complete certificate requirements.
- The insights gained from the global experience must be a component of the dissertation defense.

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Organizational Communication, Graduate Certificate—Online

The study of organizational communication focuses on the dynamics of communication in complex organizations for the purpose of learning how individuals within such organizations can become effective communicators. Whether the context for such communication is meetings or professional presentations, communicating during a crisis, or intercultural exchanges, the message is consistent: Effective communication is a crucial factor in determining organizational success.

For the 2025–2026 academic year, the Graduate Certificate in Organizational Communication is being offered as a collaboration between the College of Professional Studies and the Office of the Provost. During this period, students will follow Northeastern University's Graduate Academic Calendar and be governed by the academic policies and procedures documented in the university's Graduate Catalog (p. 87).

During the time a student is designated under the Office of the Provost, the College of Professional Studies will provide each student with full academic and student support services (e.g., academic advising services, co-op and career advising services, International Tutoring Center, etc.).

Beginning in the 2026–2027 academic year, students enrolled in this graduate certificate program will transition to the College of Professional Studies, and their official college designation will be updated accordingly in the academic system of record. At that time, students will be governed by the academic policies and procedures documented in the university's Graduate Catalog (p. 986), specifically relating to the College of Professional Studies.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
CMN 6150	Communication Research and Strategy	3
CMN 6230	Content Creation and Delivery	3
CMN 6250	Organizational Communication Assessment	3
CMN 6300	Organizational Culture, Climate, and Communication	3

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Postsecondary Teaching, Graduate Certificate (Boston)

The Certificate in Postsecondary Teaching prepares graduate students to be effective teachers and educators both inside and outside the classroom. It focuses on both didactic training in best practices and pedagogy around traditional teaching as well as online teaching. Finally, it is anchored by a teaching practicum where students put into practice what they have learned.

Program Requirements

Requirements

Code	Title	Hours
Required Courses		
INPR 5100	Foundations of Evidence-based Postsecondary Teaching	4
INPR 5110	Integrating Teaching Across Contexts	4
INPR 5120	Postsecondary Teaching Practicum	4

Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

Project Management, Graduate Certificate—Online

The Graduate Certificate in Project Management is designed to accommodate professionals with various levels of project management experience. Project management principles apply to both manufacturing and service industries including professionals in fields such as software engineering, construction management, and financial services.

For the 2025–2026 academic year, the Graduate Certificate in Project Management is being offered as a collaboration between the College of Professional Studies and the Office of the Provost. During this period, students will follow Northeastern University's Graduate Academic Calendar and be governed by the academic policies and procedures documented in the university's Graduate Catalog (p. 87).

During the time a student is designated under the Office of the Provost, the College of Professional Studies will provide each student with full academic and student support services (e.g., academic advising services, co-op and career advising services, International Tutoring Center, etc.).

Beginning in the 2026–2027 academic year, students enrolled in this graduate certificate program will transition to the College of Professional Studies, and their official college designation will be updated accordingly in the academic system of record. At that time, students will be governed by the academic policies and procedures documented in the university's Graduate Catalog (p. 986), specifically relating to the College of Professional Studies.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Required Courses

Code	Title	Hours
PJM 6100	Foundations of Project Management	3
PJM 6120	Project Scope, Schedule, and Cost Management	3
PJM 6200	Project Risk Management	3
PJM 6300	Project Quality Management	3

Program Credit/GPA Requirements

12 semester hours required

Minimum 3.000 GPA required

3-D Animation, Graduate Certificate (Boston)	1088
Academic Appeals Policies	1115
Academic Appeals Policies and Procedures	133
Academic Appeals Policy	1338
Academic Appeals Procedures	1239
Academic Calendars	136
Academic Consequences for Violating the University Academic Integrity Policy	91
Academic Dismissal Policy	461
Academic Integrity	323
Academic Integrity Policy	88
Academic Integrity Policy	461
Academic Policies	461
Academic Policies and Procedures	87
Academic Policies and Procedures	195
Academic Policies and Procedures	323
Academic Policies and Procedures	772
Academic Policies and Procedures	962
Academic Policies and Procedures	987
Academic Policies and Procedures	1115
Academic Policies and Procedures	1338
Academic Probation and Dismissal	324
Academic Progression Standards	987
Academic Resources	58
Academic Resources	988
Academic Standing Policy	462
Accelerated Degrees	983
Accommodations for Students with Disabilities	92
Accounting and Business Administration, MSAMBA (Boston)	283
Accounting and Financial Decision Making, Graduate Certificate (Boston)	307
Accounting, MSA (Boston)	282
Accreditation	26
Active-Duty Military Personnel	988
Additional Programs	1355
Adult-Gerontology Nurse Practitioner, Acute Care, CAGS (Boston)	896
Adult-Gerontology Nurse Practitioner, Primary Care, CAGS (Boston)	897
Advanced and Intelligent Manufacturing, MS (Boston)	622
Agile Project Management, Graduate Certificate (Boston)	1088
AI Applications, Graduate Certificate (Boston)	190
AI Applications, Graduate Certificate (Boston)	190

AI Applications, Graduate Certificate (Boston)	190
AI Applications, Graduate Certificate (Boston)	190
AI Applications, Graduate Certificate (Boston)	190
AI Applications, Graduate Certificate (Boston)	190
AI Applications, Graduate Certificate (Boston)	190
AI Applications, Graduate Certificate (Boston)	190
AI Applications, Graduate Certificate (Boston)	190
AI Applications, Graduate Certificate (Silicon Valley)	191
AI Applications, Graduate Certificate (Silicon Valley)	191
Analytics, MPS (Arlington)	1015
Analytics, MPS (Boston)	1017
Analytics, MPS (Oakland)	1019
Analytics, MPS (Portland)	1021
Analytics, MPS (Seattle)	1022
Analytics, MPS (Silicon Valley)	1024
Analytics, MPS (Toronto)	1026
Analytics, MPS (Vancouver)	1027
Appeals Policy	462
Applied AI, MPS (Boston)	1357
Applied AI—Connect, MPS (Boston)	1359
Applied Analytics, Graduate Certificate (Boston)	1089
Applied Analytics, Graduate Certificate (Portland)	1090
Applied Behavior Analysis, MS (Boston)	854
Applied Behavior Analysis, MS (Charlotte)	856
Applied Educational Psychology, MS (Boston)	858
Applied Logistics, MPS (Boston)	1029
Applied Machine Intelligence, MPS (Boston)	1031
Applied Machine Intelligence, MPS (Portland)	1033
Applied Mathematics, Graduate Certificate (Boston)	1192
Applied Mathematics, MS (Boston)	1184
Applied Physics and Engineering, MS (Boston)	557
Applied Physics and Engineering, MS (Boston)	557
Applied Physics and Engineering, MS (Boston)	557
Applied Physics and Engineering, MS (Boston)	557
Applied Psychology in Context, Graduate Certificate (Boston)	812
Applied Psychology in Context, Graduate Certificate (Boston)	812
Applied Psychology, MS (Boston)	859
Applied Quantitative Methods and Social Analysis, MS (Arlington)	1323
Applied Quantitative Methods and Social Analysis, MS (Boston)	1321
Art + Design	210
Artificial Intelligence, MS (Boston)	164
Artificial Intelligence, MS (Boston)	164
Artificial Intelligence, MS (Boston)	164

Artificial Intelligence, MS (Boston)	164
Artificial Intelligence, MS (Boston)	164
Artificial Intelligence, MS (Portland)	345
Artificial Intelligence, MS (Seattle)	346
Artificial Intelligence, MS (Silicon Valley)	348
Arts Administration and Cultural Entrepreneurship, MS (Boston)	246
Arts Administration, Graduate Certificate (Boston)	259
Attendance Policy	324
Attendance Policy	463
Attendance Requirements	93
Attendance Verification	988
Audit Policy	136
Authorizations	31
Awards	1117
Billing and Tuition Adjustments	79
Biodefense and Biosecurity, Graduate Certificate (Boston)	1159
Bioengineering	470
Bioengineering, MSBioE (Boston)	493
Bioengineering, MSBioE—Connect (Boston)	498
Bioengineering, PhD (Boston)	471
Bioengineering, PhD (Portland)	479
Bioinformatics, Graduate Certificate (Boston)	1136
Bioinformatics, Graduate Certificate (Portland)	1138
Bioinformatics, MS (Boston)	1123
Bioinformatics, MS (Oakland)	1127
Bioinformatics, MS (Portland)	1130
Bioinformatics, MS (Toronto)	1133
Biology	1121
Biology, PhD (Boston)	1121
Biomedical Science, MS (Boston)	945
Biomedical Science, PhD (Boston)	915
Biopharmaceutical Analytical Sciences, Graduate Certificate (Boston)	1160
Biopharmaceutical Regulatory Affairs, Graduate Certificate (Boston)	1090
Biophysics, PhD (Boston)	1219
Biotechnology Enterprise, Graduate Certificate (Boston)	1161
Biotechnology, Graduate Certificate (Boston)	1160
Biotechnology, Graduate Certificate (Portland)	1160
Biotechnology, MS (Boston)	1142
Biotechnology, MS (Oakland)	1147
Biotechnology, MS (Portland)	1150
Biotechnology, MS (Toronto)	1154
Biotechnology Regulatory Science, Graduate Certificate (Boston)	1161

Blockchain and Smart Contract Engineering, Graduate Certificate (Arlington)	737
Blockchain and Smart Contract Engineering, Graduate Certificate (Boston)	737
Bouvé College of Health Sciences	771
Brand Management, Graduate Certificate (Boston)	308
Broadband Wireless Systems, Graduate Certificate (Boston)	738
Business Administration, Graduate Certificate (Boston)	309
Business Administration, Graduate Certificate (Miami)	310
Business Administration, Graduate Certificate—Online	311
Business Administration, MBA—Full-Time / Finance, MSF (Boston)	304
Business Administration, MBA—Full-Time (Boston)	288
Business Administration, MBA—Online	297
Business Administration, MBA—Part-Time / Finance, MSF (Boston)	304
Business Administration, MBA—Part-Time (Boston)	298
Business Analytics, Graduate Certificate (Boston)	312
Business Analytics, MS (Boston)	263
Business Analytics, MS (Oakland)	264
Business Analytics—Online, MS	265
Business Law, Graduate Certificate (Boston)	973
Business Management for Healthcare, Graduate Certificate (Boston)	312
 Campus Resources	 61
Campus Transfer	324
Campus Transfer and Campus Location Change	94
Campus Transfer and Location Change	463
Cannabis Science, Graduate Certificate (Boston)	812
Cannabis Science, Graduate Certificate (Boston)	812
Cell and Gene Therapies, MS (Boston)	1135
Center for Advancing Teaching and Learning Through Research	61
Certificate Policies and Procedures	464
Certificates	325
Changes in Requirements	1117
Changes in Requirements	1340
Chemical Engineering	499
Chemical Engineering, MSChE (Boston)	509
Chemical Engineering, PhD (Boston)	500
Chemistry and Chemical Biology	1140
Chemistry, MS (Boston)	1157
Chemistry, PhD (Boston)	1141
Civil and Environmental Engineering	514
Civil and Environmental Engineering, PhD (Boston)	516
Civil Engineering with Concentration in Construction Management, MSCivE (Boston)	526
Civil Engineering with Concentration in Data and Systems, MSCivE (Boston)	528
Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering, MSCivE (Boston)	531

Civil Engineering with Concentration in Structures, MSCivE (Boston)	533
Civil Engineering with Concentration in Transportation, MSCivE (Boston)	535
Civil Engineering with Concentration in Water, Environmental, and Coastal Systems, MSCivE (Boston)	537
Clearing an Academic Deficiency	95
Climate and Engineering, Graduate Certificate (Boston)	543
Climate Science and Engineering, MS (Boston)	520
Climate Science and Engineering, MS (Boston)	520
Climate Science and Engineering, MS (Boston)	520
Climate Science and Engineering, MS (Boston)	520
Cloud Computing Application and Management, Graduate Certificate (Boston)	1091
Code of Student Conduct	96
College of Arts, Media and Design	194
College of Engineering	460
College of Professional Studies	986
College of Science	1114
College of Social Sciences and Humanities	1238
Collegiate Athletics Administration, Graduate Certificate (Boston)	1091
Commerce and Economic Development, MS (Boston)	1049
Communication Studies	228
Completing Degree Requirements	989
Complex Network Analysis, MS (Boston)	166
Complex Network Analysis, MS (Boston)	166
Complex Network Analysis, MS (Boston)	166
Complex Network Analysis, MS (Boston)	166
Complex Network Analysis, MS (Boston)	166
Complex Network Analysis, MS (Boston)	166
Complex Network Analysis, MS (Boston)	166
Computational Social Science, Graduate Certificate (Arlington)	1334
Computational Social Science, Graduate Certificate (Boston)	1333
Computer Engineering, PhD (Boston)	546
Computer Science	327
Computer Science, Graduate Certificate (Boston)	416
Computer Science, MSCS (Arlington)	386
Computer Science, MSCS (Boston)	388
Computer Science, MSCS (Miami)	389
Computer Science, MSCS (Oakland)	391
Computer Science, MSCS (Portland)	392
Computer Science, MSCS (Seattle)	395
Computer Science, MSCS (Silicon Valley)	394
Computer Science, MSCS (Vancouver)	398
Computer Science, MSCS—Align (Arlington)	400
Computer Science, MSCS—Align (Boston)	402
Computer Science, MSCS—Align (Miami)	404

Computer Science, MSCS—Align (Oakland)	405
Computer Science, MSCS—Align (Portland)	407
Computer Science, MSCS—Align (Seattle)	409
Computer Science, MSCS—Align (Silicon Valley)	412
Computer Science, MSCS—Align (Vancouver)	413
Computer Science, PhD (Boston)	329
Construction Management, Graduate Certificate (Boston)	1092
Contact Student Financial Services (SFS)	71
Continuity of Registration	1340
Cooperative Education	137
Cooperative Education Policies	1117
Corporate and Organizational Communication, MS (Boston)	1051
Corporate Finance, Graduate Certificate (Boston)	313
Corporate Innovation, Graduate Certificate (Boston)	313
Corporate Renewal, Graduate Certificate (Boston)	314
Counseling Psychology, MSCP (Boston)	860
Counseling Psychology, PhD (Boston)	849
Course Credit Guidelines	112
Course Credit Sharing	139
Course Numbering System	113
Course Overload	325
Course Registration	466
Course Registration	1118
Course Registration and Advising	1340
Course Retake / Course Substitution	466
Course Selection	467
Course Substitutions	114
Course Withdrawal	114
Creative Collaboration and Multidisciplinary Design, MS (Boston)	248
Crime Analysis and Mapping, Graduate Certificate (Boston)	1251
Criminology and Criminal Justice, MS (Boston)	1249
Criminology and Justice Policy, PhD (Boston)	1246
Cross-Cultural Communication, Graduate Certificate (Boston)	1092
Cross-Disciplinary Science PhD	1218
Cultural Entrepreneurship, Graduate Certificate (Boston)	259
Cyber-Physical Systems, MS (Boston)	722
Cyber-Physical Systems, MS (Toronto)	723
Cybersecurity	417
Cybersecurity, Graduate Certificate (Boston)	429
Cybersecurity, MS (Arlington)	422
Cybersecurity, MS (Boston)	424
Cybersecurity, MS—Align (Arlington)	426
Cybersecurity, MS—Align (Boston)	428

Cybersecurity, PhD (Boston)	418
Cybersecurity, PhD (Boston)	418
Cybersecurity, PhD (Boston)	418
D'Amore-McKim School of Business	262
Data Analytics Engineering, Graduate Certificate (Boston)	681
Data Analytics Engineering, Graduate Certificate—Online	682
Data Analytics Engineering, MS (Boston)	628
Data Analytics Engineering, MS (Seattle)	631
Data Analytics Engineering, MS (Vancouver)	634
Data Analytics Engineering, MS—Online	637
Data Analytics, Graduate Certificate (Boston)	416
Data Analytics, Graduate Certificate (Boston)	416
Data Architecture and Management, MS (Boston)	724
Data Architecture and Management, MS (Seattle)	725
Data Architecture and Management, MS (Toronto)	728
Data Science, MS (Boston)	169
Data Science, MS (Boston)	169
Data Science, MS (Boston)	169
Data Science, MS (Boston)	169
Data Science, MS (Boston)	169
Data Science, MS (Portland)	355
Data Science, MS (Silicon Valley)	357
Data Science, MS—Align (Portland)	361
Data Science, MS—Align (Silicon Valley)	364
Data Science—Align, MS (Boston)	172
Data Science—Align, MS (Boston)	172
Data Science—Align, MS (Boston)	172
Definitions	154
Degrees, Majors, and Concentrations	989
Delivery of Services	21
Departmental Jurisdiction	140
Digital Humanities, Graduate Certificate (Boston)	1263
Digital Media Management, Graduate Certificate (Boston)	1093
Digital Media, MPS (Boston)	1035
Digital Media, MPS (Vancouver)	1037
Digital Media, MPS—Connect (Boston)	1038
Digital Media, MPS—Connect (Vancouver)	1041
Digital Platforms for Service Innovation, Graduate Certificate (Boston)	682
Digital Video, Graduate Certificate (Boston)	1093
Disability Resource Center	61
Dissertation Committee	467
Doctor of Philosophy	1241

Doctoral Degree Programs	995
Dropping a Class	140
Dual Degrees	303
Dual Degrees	983
Early Childhood Education, MA (Oakland)	1341
Early Intervention, Graduate Certificate (Boston)	813
Early Intervention, Graduate Certificate (Boston)	813
Economics	1252
Economics, MS (Boston)	1256
Economics, MS (Seattle)	1258
Economics, PhD (Boston)	1253
Education, EdD (Boston)	996
Education, EdD (Seattle)	999
Education, MEd (Boston)	1012
Educational Leadership, MA (Oakland)	1344
Electrical and Computer Engineering	544
Electrical and Computer Engineering Leadership, MSECEL (Boston)	611
Electrical and Computer Engineering with Concentration in Communications, Control, and Signal Processing, MSECE (Boston)	585
Electrical and Computer Engineering with Concentration in Computer Systems and Software, MSECE (Boston)	588
Electrical and Computer Engineering with Concentration in Computer Systems and Software, MSECE (Seattle)	590
Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms, MSECE (Boston)	593
Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms, MSECE (Seattle)	596
Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics, MSECE (Boston)	598
Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence, MSECE (Boston)	601
Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence, MSECE (Seattle)	604
Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices, MSECE (Boston)	606
Electrical and Computer Engineering with Concentration in Power Systems, MSECE (Boston)	609
Electrical Engineering, PhD (Boston)	551
Electrical Engineering, PhD (Oakland)	553
Elementary Education, MAT (Boston)	1008
Employer Engagement and Career Design	62
Energy Systems, Graduate Certificate (Boston)	684
Energy Systems Management, Graduate Certificate (Boston)	684
Energy Systems, MSEneS (Boston)	660
Energy Systems, MSEneS-Academic Link Program (Boston)	663
Engineering and Public Policy, MS (Boston)	523
Engineering and Public Policy, MS (Boston)	523
Engineering Business, Graduate Certificate (Boston)	685
Engineering Economic Decision Making, Graduate Certificate (Boston)	687
Engineering Leadership, Graduate Certificate (Boston)	738
Engineering Leadership, Graduate Certificate (Boston)	738
Engineering Management, Graduate Certificate (Boston)	687

Engineering Management, MSEM (Boston)	655
Engineering Management, MSEM—Online	659
English	1259
English, MA (Boston)	1262
English, PhD (Boston)	1260
Entrepreneurship, Graduate Certificate (Boston)	315
Environmental Engineering, MSEnE (Boston)	539
Environmental Science and Policy, MS (Boston)	1174
Environmental Science and Policy, MS (Boston)	1174
Environmental Science and Policy, MS (Boston)	1174
eSports, Graduate Certificate (Boston)	1094
Experience Design, Graduate Certificate (Boston)	225
Experience Design, MFA (Boston)	211
Experience Design, MS (Boston)	215
Experiential PhD (Boston)	157
Experiential Teaching and Learning, Graduate Certificate (Boston)	1094
Experimental Biotechnology, Graduate Certificate (Boston)	1162
Extended Realities, MS (Boston)	175
Extended Realities, MS (Boston)	175
Extended Realities, MS (Boston)	175
Extended Realities, MS (Boston)	175
Extended Realities, MS (Boston)	175
Extended Realities, MS (Boston)	175
Extended Realities, MS (Boston)	175
Extended Realities, MS (Boston)	175
Extended Realities, MS (Boston)	175
Extended Realities, MS (Boston)	175
Extended Realities, MS (Oakland)	179
Extended Realities, MS (Oakland)	179
Extreme Medicine, Graduate Certificate (Boston)	814
Extreme Medicine, Graduate Certificate (Boston)	814
Final Examinations and Related Policies on Other Exams	140
Finance, MSF (Boston)	284
Financial Aid	83
Financial Information	70
Financial Markets And Institutions, Graduate Certificate (Boston)	1095
Forensic Accounting, Graduate Certificate (Boston)	1095
Full-Time Status	989
Fundraising and Development, Graduate Certificate (Boston)	1096
Game Design, Graduate Certificate (Boston)	1096
Game Experience Design, Graduate Certificate (Boston)	225
Game Science and Design, MS (Boston)	217

Game Science and Design, MS (Boston)	217
Game Science and Design, MS (Boston)	217
Game Science and Design, MS (Oakland)	219
Game Science, Graduate Certificate (Boston)	226
General Information	22
General Information	195
General Information	1243
General Regulations	1239
Geographic Information Systems, Graduate Certificate (Boston)	1097
Global Doctoral Research, Graduate Certificate (Boston)	1361
Global Partnership Programs	990
Global Studies And International Relations, Graduate Certificate (Boston)	1097
Global Studies and International Relations, MS (Boston)	1054
Gordon Institute of Engineering Leadership	1349
Governing Boards and Officers of Northeastern	23
Grade Appeal Policy	195
Grade Change Policy	114
Grade Table and GPA	115
Grades	962
Grading	1340
Grading Policies	1120
Graduate	58
Graduate Campus	990
Graduate Certificate Programs	770
Graduate Certificate Programs	1087
Graduate Certificate Programs	1236
Graduate Certificates	306
Graduate Certificates	973
Graduate Student Classification	196
Graduation Requirements	117
Grievance Policy	468
Health Data Analytics, MS—Online	800
Health Data Analytics, MS—Online	800
Health Informatics Management and Exchange, Graduate Certificate (Boston)	815
Health Informatics Management and Exchange, Graduate Certificate (Boston)	815
Health Informatics, MS (Boston)	447
Health Informatics, MS (Boston)	447
Health Informatics, MS (Boston)	447
Health Informatics, MS (Vancouver)	450
Health Informatics, MS (Vancouver)	450
Health Informatics, MS (Vancouver)	450
Health Law and Policy, Graduate Certificate (Boston)	975

Health Law, Graduate Certificate (Boston)	974
Healthcare Compliance, Graduate Certificate (Boston)	973
Healthcare Leadership, DMSc (Boston)	788
Healthcare Leadership, DMSc (Boston)	788
Higher Education Administration, Graduate Certificate (Boston)	1098
Higher Education Administration, MEd (Boston)	1014
History	1265
History, MA (Boston)	1267
History, PhD (Boston)	1265
Human Behavior and Sustainability Sciences, PhD (Boston)	1169
Human Behavior and Sustainability Sciences, PhD (Boston)	1169
Human Factors, MS (Boston)	638
Human Movement and Rehabilitation Sciences, MS (Boston)	845
Human Movement and Rehabilitation Sciences, PhD (Boston)	831
Human Resources Law, Graduate Certificate (Boston)	976
Human Resources Management, Graduate Certificate (Boston)	1099
Human Resources Management, MS (Boston)	1057
Human Rights Law, Graduate Certificate (Boston)	976
Human-Centered Informatics, Graduate Certificate (Boston)	1099
Inclusive Computer Science Education, Graduate Certificate (Portland)	417
Incomplete Grades	326
Industrial Engineering, MSIE (Boston)	651
Industrial Engineering, PhD (Boston)	614
Informatics, MPS (Boston)	1042
Informatics, MPS (Toronto)	1044
Information Design and Data Visualization, MFA (Boston)	213
Information Design and Data Visualization, MS (Boston)	221
Information Design and Data Visualization, MS (Vancouver)	222
Information Design and Visualization, Graduate Certificate (Boston)	227
Information Ethics, Graduate Certificate (Boston)	1334
Information for Entering Students	58
Information for International Students	67
Information Security Management, Graduate Certificate (Boston)	1100
Information Systems, MSIS (Arlington)	692
Information Systems, MSIS (Boston)	693
Information Systems, MSIS (Miami)	695
Information Systems, MSIS (Oakland)	697
Information Systems, MSIS (Portland)	698
Information Systems, MSIS (Seattle)	700
Information Systems, MSIS (Silicon Valley)	701
Information Systems, MSIS (Toronto)	702
Information Systems, MSIS (Vancouver)	704

Information Systems, MSIS—Bridge (Arlington)	708
Information Systems, MSIS—Bridge (Boston)	710
Information Systems, MSIS—Bridge (Miami)	711
Information Systems, MSIS—Bridge (Oakland)	713
Information Systems, MSIS—Bridge (Portland)	713
Information Systems, MSIS—Bridge (Seattle)	714
Information Systems, MSIS—Bridge (Silicon Valley)	716
Information Systems, MSIS—Bridge (Toronto)	716
Information Systems, MSIS—Bridge (Vancouver)	719
Information Systems, MSIS—Bridge—Online	721
Information Systems, MSIS—Online	706
Information Technology Services	68
Instructional Methods	119
Insurance Analytics and Management, Graduate Certificate (Boston)	1101
Insurance Analytics and Management, MPS (Boston)	1046
Intellectual Property Law, Graduate Certificate (Boston)	977
Interactive Design, Graduate Certificate (Boston)	1101
Interdisciplinary Design and Media, PhD (Boston)	237
Interdisciplinary Engineering, PhD (Boston)	486
Interdisciplinary Engineering, PhD (Boston)	486
Interdisciplinary Engineering, PhD (Boston)	486
Interdisciplinary Engineering, PhD (Boston)	486
Interdisciplinary Engineering, PhD (Boston)	486
Interdisciplinary Engineering, PhD (Boston)	486
Interdisciplinary Graduate Programs	742
Interdisciplinary, PhD (Boston)	158
Interdisciplinary, PhD (Portland)	160
Interdisciplinary Programs	236
Interdisciplinary Programs	430
Interdisciplinary Programs	780
Interdisciplinary Programs	1218
Interdisciplinary Programs	1317
International Affairs, MA (Boston)	1283
International Biopharmaceutical Regulatory Affairs, Graduate Certificate (Boston)	1102
International Business, Graduate Certificate (Boston)	315
International Management, MS (Boston)	270
Internet of Things, MS (Boston)	372
Internet of Things, MS (Boston)	372
Investments, Graduate Certificate (Boston)	316
IP Telephony Systems, Graduate Certificate (Boston)	740
Journalism, MA (Boston)	231
Khoury College of Computer Sciences	322

Law and Policy, DLP (Boston)	1001
Law and Policy, DLP (Seattle)	1002
Law, JD / Accounting and Business Administration, MSAMBA (Boston)	305
Law, JD / Accounting and Business Administration, MSAMBA (Boston)	305
Law, JD / Business Administration, MBA—Full-Time (Boston)	305
Law, JD / Business Administration, MBA—Full-Time (Boston)	305
Law, JD / Criminology and Criminal Justice, MS (Boston)	984
Law, JD / Criminology and Criminal Justice, MS (Boston)	984
Law, JD / Criminology and Justice Policy, PhD (Boston)	984
Law, JD / Criminology and Justice Policy, PhD (Boston)	984
Law, JD / Public Health, MPH (Boston)	810
Law, JD / Public Health, MPH (Boston)	810
Law, JD / Public Health, MPH (Boston)	810
Law, JD / Public Policy, MPP (Boston)	984
Law, JD / Public Policy, MPP (Boston)	984
Law, JD (Boston)	962
Law, LLM / Business Administration, MBA—Full-Time (Boston)	305
Law, LLM / Business Administration, MBA—Full-Time (Boston)	305
Law, LLM (Boston)	964
Law, LLM—Online	970
Leadership, Graduate Certificate (Boston)	1102
Leading and Managing Technical Projects, Graduate Certificate (Boston)	1103
Leading People and Organizations, Graduate Certificate (Boston)	316
Lean Six Sigma, Graduate Certificate (Boston)	688
Learning Experience Design and Technology, Graduate Certificate (Boston)	1104
Learning Experience Design and Technology, MPS (Boston)	1047
Leaves of Absence and University Withdrawal	120
Legal Design, Graduate Certificate (Boston)	978
Legal Studies, MLS—Online	970
Libraries	59
Major CIP Codes	37
Management, MS (Boston)	271
Management, MS with Major in Fintech Management (Miami)	281
Manufacturing and Quality Operations in Biotechnology, Graduate Certificate (Boston)	1162
Marine and Environmental Sciences	1164
Marine and Environmental Sciences, PhD (Boston)	1165
Marine Biology, MS (Boston)	1175
Marketing Analytics, Graduate Certificate (Boston)	318
Marketing, Graduate Certificate (Boston)	317
Master of Architecture—One-Year Program (Boston)	198
Master of Architecture—Three-Year Program (Boston)	202
Master of Architecture—Three-Year Program—Advanced Degree Entrance (Boston)	205

Master of Architecture—Two-Year Program (Boston)	199
Master of Business Administration	288
Master of Science	263
Master's Degree Admission Requirements	990
Master's Degree Policies	197
Master's Degree Programs	1003
Master's Degrees	1244
Mathematics	1177
Mathematics, MS (Boston)	1187
Mathematics, PhD (Boston)	1178
Mechanical and Industrial Engineering	612
Mechanical Engineering, PhD (Boston)	619
Mechanical Engineering with Concentration in General Mechanical Engineering, MSME (Boston)	664
Mechanical Engineering with Concentration in Materials Science, MSME (Boston)	667
Mechanical Engineering with Concentration in Mechanics and Design, MSME (Boston)	669
Mechanical Engineering with Concentration in Mechatronics, MSME (Boston)	672
Mechanical Engineering with Concentration in Thermofluids, MSME (Boston)	675
Media Advocacy, MS (Boston)	232
Media Advocacy, MS (Boston)	232
Media Innovation and Data Communication, MS (Boston)	223
Media Innovation and Data Communication, MS (Boston)	223
Media, Technology, and Ethics, MS (Boston)	229
Media, Technology, and Ethics, MS (Boston)	229
Medical Devices Regulatory Affairs, Graduate Certificate (Boston)	1105
Medical Software Engineering, Graduate Certificate (Boston)	740
Medicinal Chemistry and Drug Discovery, MS (Boston)	947
Medicinal Chemistry and Drug Discovery, PhD (Boston)	921
Mills College at Northeastern	1337
Minimum Cumulative GPA	141
Molecular Biotechnology, Graduate Certificate (Boston)	1162
Molecular Biotechnology, Graduate Certificate (Portland)	1163
Multidisciplinary Programs	691
Multiple Subject Education, MA (Oakland)	1345
Mutual Fund Management, Graduate Certificate (Boston)	318
Nanomedicine, Graduate Certificate (Boston)	1211
Nanomedicine, MS (Boston)	1205
Neonatal Nurse Practitioner, CAGS (Boston)	898
Network Science, PhD (Boston)	241
Network Science, PhD (Boston)	241
Network Science, PhD (Boston)	241
Network Science, PhD (Boston)	241
Network Science, PhD (Boston)	241

Network Science, PhD (Boston)	241
New Student Orientation (On-Ground and Online)	991
Nonclinical Biomedical Product Regulation, Graduate Certificate (Boston)	1105
Nonprofit Management, Graduate Certificate (Boston)	1106
Nonprofit Management, MS (Boston)	1060
Nonprofit Sector, Philanthropy, and Social Change, Graduate Certificate (Arlington)	1307
Nonprofit Sector, Philanthropy, and Social Change, Graduate Certificate (Boston)	1307
Northeastern University Student Health Plan (NUSHP)	86
Notifications and Disclosures	35
Nurse Anesthesia, DNP (Boston)	890
Nursing, DNP (Boston)	892
Nursing, DNP—Post-Masters (Boston)	895
Nursing, DNP—Post-Masters (Charlotte)	896
Nursing Leadership, MS (Boston)	909
Nursing, MS (Boston)	901
Nursing, PhD (Boston)	888
Nursing—Direct Entry, MS (Boston)	905
Off Campus Engagement and Support	69
Office of the University Registrar	60
Omics, Graduate Certificate (Boston)	1139
Operations Research, MSOR (Boston)	677
Operations Research, MSOR (Boston)	1191
Organizational Communication, Graduate Certificate (Boston)	1107
Organizational Communication, Graduate Certificate—Online	1361
Organizational Leadership, MS (Boston)	1064
Overload Conditions for Graduate Assistants	141
Patient Safety, Graduate Certificate (Boston)	815
Patient Safety, Graduate Certificate (Boston)	815
Payment	82
Pediatric Nurse Practitioner, Acute and Primary Care, CAGS (Boston)	899
Pediatric Nurse Practitioner, Acute Care, CAGS (Boston)	898
Pediatric Nurse Practitioner, Acute Care, Graduate Certificate (Boston)	911
Pediatric Nurse Practitioner, Primary Care, CAGS (Boston)	900
Personal Health Informatics, PhD (Boston)	339
Personal Health Informatics, PhD (Boston)	339
Personal Health Informatics, PhD (Boston)	339
Personal Health Informatics, PhD (Boston)	339
Personal Information	123
Personal Professional Enrichment (PPE)	991
Pharmaceutical Engineering, MS (Boston)	507
Pharmaceutical Engineering, MS (Boston)	507
Pharmaceutical Engineering, MS (Boston)	507

Pharmaceutical Technologies, Graduate Certificate (Boston)	1163
Pharmaceutics and Drug Delivery, MS (Boston)	952
Pharmaceutics and Drug Delivery, PhD (Boston)	927
Pharmacology, MS (Boston)	955
Pharmacology, PhD (Boston)	933
Pharmacy, PharmD (Boston)	938
Pharmacy, PharmD—Direct Entry / Public Health, MPH (Boston)	811
Pharmacy, PharmD—Direct Entry / Public Health, MPH (Boston)	811
Pharmacy, PharmD—Direct Entry / Public Health, MPH (Boston)	811
Pharmacy, PharmD—Direct Entry (Boston)	939
PhD Programs	155
PhD Student Progress and Review	468
Physical Therapy, DPT—Postbaccalaureate Entry (Boston)	834
Physician Assistant, MS (Boston)	830
Physics	1193
Physics, MS (Boston)	1209
Physics, PhD (Boston)	1193
Physics, PhD—Advanced Entry (Boston)	1197
Political Science	1269
Political Science, MA (Boston)	1272
Political Science, PhD (Boston)	1270
Population Health, PhD (Boston)	866
Postsecondary Teaching, Graduate Certificate (Boston)	1362
Poverty Law and Economic Justice, Graduate Certificate (Boston)	979
Primary Care Nursing FNP, Graduate Certificate (Boston)	912
Privacy Law, Graduate Certificate (Boston)	981
Process Safety Engineering, Graduate Certificate (Boston)	514
Process Science, Graduate Certificate (Boston)	1164
Product Development, MS (Boston)	765
Product Management, Graduate Certificate (Boston)	192
Product Management, Graduate Certificate (Boston)	192
Product Management, Graduate Certificate (Boston)	192
Product Management, Graduate Certificate (Boston)	192
Product Management, Graduate Certificate (Boston)	192
Professional Sports Administration, Graduate Certificate (Boston)	1107
Professional Studies, DPS (Boston)	1356
Program Completion	469
Project Business Analysis, Graduate Certificate (Boston)	1108
Project Management, Graduate Certificate (Boston)	1108
Project Management, Graduate Certificate (Portland)	1109
Project Management, Graduate Certificate—Online	1362
Project Management, MS (Arlington)	1067
Project Management, MS (Boston)	1068

Project Management, MS (Miami)	1071
Project Management, MS (Portland)	1072
Project Management, MS (Seattle)	1075
Project Management, MS (Silicon Valley)	1077
Project Management, MS (Toronto)	1078
Psychiatric-Mental Health Nurse Practitioner, CAGS (Boston)	900
Psychology	1212
Psychology, PhD (Boston)	1215
Public Administration, MPA (Arlington)	1285
Public Administration, MPA (Boston)	1286
Public Administration, MPA (Oakland)	1287
Public and Media Relations, Graduate Certificate (Boston)	1110
Public Health, MPH / Health Informatics, MS (Boston)	811
Public Health, MPH / Health Informatics, MS (Boston)	811
Public Health, MPH (Boston)	869
Public Health, MPH (Charlotte)	871
Public Health, MPH—Accelerated (Boston)	872
Public History, Graduate Certificate (Boston)	1269
Public Policy Analysis, Graduate Certificate (Arlington)	1308
Public Policy Analysis, Graduate Certificate (Boston)	1309
Public Policy, MPP (Arlington)	1289
Public Policy, MPP (Boston)	1290
Public Policy, MPP (Oakland)	1292
Public Policy, PhD (Boston)	1278
Public Safety	63
Quality Assurance Compliance, Graduate Certificate (Boston)	1111
Quantitative Finance, MSF / Business Administration, MBA—Full-Time (Boston)	306
Quantitative Finance, MSF (Boston)	285
Quantitative Finance, MSF (Oakland)	286
Readmission to Program	991
Reenrollment Policy for Full-time Students	469
Reentry to Program	326
Reentry to Program	991
Registration and Taking Courses	991
Regulations and Requirements for All Graduate Degree Programs	143
Regulations and Requirements for Certificates of Advanced Graduate Study	150
Regulations and Requirements for Doctor of Philosophy (PhD) Programs	151
Regulations and Requirements for Graduate Certificate Programs	145
Regulations and Requirements for Interdisciplinary Graduate Degree Programs	153
Regulations and Requirements for PlusOne Degree Combinations	147
Regulations and Requirements for Professional Doctorate Degree Programs	148
Regulations and Requirements for The Master's Degree	146

Regulations for All Students	1244
Regulatory Affairs, MS (Boston)	1081
Regulatory Affairs, MS (Toronto)	1083
Reinstatement after Academic Dismissal	993
Remote Sensing, Graduate Certificate (Boston)	1111
Renewable Energy, Graduate Certificate (Boston)	688
Requesting and Clearing An Incomplete Grade	123
Resilience Studies, Graduate Certificate (Boston)	1276
Resilience Studies, MS (Boston)	1275
Resources	57
Retaking Courses	123
Retaking Courses	326
Robotics, MS (Boston)	180
Robotics, MS (Boston)	180
Robotics, MS (Boston)	180
Robotics, MS (Boston)	180
Robotics, MS (Boston)	180
Robotics, MS (Boston)	180
Robotics, MS (Boston)	180
Robotics, MS (Seattle)	184
Robotics, MS (Seattle)	184
Robotics, MS (Seattle)	184
Robotics, MS (Seattle)	184
Robotics, MS (Seattle)	184
Satisfactory Progress	1120
Satisfactory Progress	1341
Satisfactory/Unsatisfactory Grading	141
Satisfactory/Unsatisfactory (Pass/Fail) Policy	326
School of Architecture	198
School of Clinical and Rehabilitation Sciences	816
School of Community Health and Behavioral Sciences	847
School of Criminology and Criminal Justice	1246
School of Journalism	231
School of Law	960
School of Nursing	887
School of Pharmacy and Pharmaceutical Sciences	914
School of Public Policy and Urban Affairs	1277
School Psychology, CAGS (Boston)	853
School Psychology, PhD (Boston)	851
Secondary Education, MAT (Boston)	1010
Security and Intelligence Studies, MA (Arlington)	1004
Security and Intelligence Studies, MA (Boston)	1007
Seeking More than One Certificate or Degree	993

Semiconductor Engineering, MS (Boston)	580
Semiconductor Engineering, MS (Boston)	580
Single Subject Education, MA (Oakland)	1346
Social Media for Organizational Performance, Graduate Certificate (Boston)	1112
Sociology	1312
Sociology, PhD (Boston)	1313
Software Engineering Systems, Graduate Certificate (Arlington)	741
Software Engineering Systems, Graduate Certificate (Boston)	689
Software Engineering Systems, Graduate Certificate (Boston)	689
Software Engineering Systems, MS (Arlington)	730
Software Engineering Systems, MS (Boston)	732
Software Engineering Systems, MS (Toronto)	733
Special Student Status	994
Speech-Language Pathology, MS (Boston)	818
Speech-Language Pathology, MS (Charlotte)	820
Speech-Language Pathology, MS—Connect (Boston)	822
Speech-Language Pathology, MS—Connect (Charlotte)	823
Sports Leadership, MSLD (Boston)	1085
Statistics, MS (Boston)	187
Statistics, MS (Boston)	187
Statistics, MS (Boston)	187
Statistics, MS (Boston)	187
Statistics, MS (Boston)	187
Statistics, MS (Boston)	187
Statistics, MS—Connect (Boston)	189
Statistics, MS—Connect (Boston)	189
Statistics, MS—Connect (Boston)	189
Statistics, MS—Connect (Boston)	189
Statistics, MS—Connect (Boston)	189
Statistics, MS—Connect (Boston)	189
Student Bill of Academic Rights and Responsibilities	124
Student Complaints	142
Student Complaints and Grievance Process	1341
Student Evaluation of Courses	994
Student Records Privacy	127
Student Responsibility Statement	129
Student Right-to-Know Act	129
Student Time Status	130
Supply Chain Engineering Management, Graduate Certificate (Boston)	689
Supply Chain Management, Graduate Certificate (Boston)	320
Sustainability and Business, Graduate Certificate (Boston)	321
Sustainability and Climate Change Policy, Graduate Certificate (Boston)	1310
Sustainability Engineering, Graduate Certificate (Boston)	544

Sustainability Engineering Leadership, MS (Boston)	525
Sustainability Sciences, Graduate Certificate (Boston)	1176
Sustainable Building Systems, MSSBS (Boston)	541
Sustainable Energy Systems, Graduate Certificate (Boston)	690
Sustainable Urban Environments, MDes—One-Year Program (Boston)	209
Sustainable Urban Environments, MDes—Two-Year Program (Boston)	209
Technology Leadership, Graduate Certificate (Boston)	1352
Technology Systems Management, Graduate Certificate (Boston)	690
Telecommunication Networks, MS (Boston)	735
The Doctor of Philosophy Degree (PhD)	1119
The Master's Degree Academic Requirements	1120
Thesis Policy	470
Time Limitation	1120
Time Limitation	1341
Transfer Credit	143
Transfer Credit Policies	994
Transfer of Credit	326
Tuition and Fees	72
United States Law, Graduate Certificate (Boston)	981
University Health and Counseling Services	65
University Interdisciplinary Programs	163
University Leadership	25
University-Sponsored Travel	132
Urban Analytics, Graduate Certificate (Boston)	1311
Urban Informatics, MS (Arlington)	1298
Urban Informatics, MS (Boston)	1299
Urban Planning and Policy, MS (Boston)	254
Urban Planning and Policy, MS (Boston)	254
Urban Studies, Graduate Certificate (Boston)	1311
Usability, Graduate Certificate (Boston)	1112
Vaccine Development, Graduate Certificate (Boston)	1164
We Care	66
Wireless and Network Engineering, MS (Boston)	583
Women, Gender, Sexuality, and the Law, Graduate Certificate (Boston)	982
Women's, Gender, and Sexuality Studies, Graduate Certificate (Boston)	1335