

COMPUTER ENGINEERING, BS

for the degree of Bachelor of Science in Computer Engineering

Computer Engineering is a blooming discipline focused on the development of vital computing technologies that range from chips to computers to networks to programming tools and key algorithms. Fundamentally, Computer Engineering addresses the problem of building scalable, trustworthy computing systems and applications, and the faculty's interests span a broad spectrum of issues pertinent to this theme. Computer engineering has taken the lead in revolutionizing many science and engineering disciplines with parallel computing, from chips to clouds to planet-scale critical infrastructures, and has defined new standards of security, privacy, and dependability for systems ranging from small circuits to the electric power grids of many nations. Students need a broad and sound set of mathematical and computing skills and are well-served by a flexible curriculum that enables them to pursue topics of interest among the many subdisciplines in computing.

The computer engineering core curriculum focuses on fundamental computer engineering knowledge: circuits, systems, electromagnetics, computer systems, electronics for information processing and communication, and computer science. The rich set of ECE elective courses permits students to concentrate in any sub-discipline of computer engineering including hardware systems; cyberphysical systems; foundations and theory; software and languages; algorithms and mathematical tools; trust, reliability, security; networking, mobile and distributed computing; big data analytics and systems; AI, machine learning, robotics, cybernetics.

Current Program Educational Objectives

for the degree of Bachelor of Science in Computer Engineering

Graduation Requirements

Minimum Technical GPA (<https://go.grainger.illinois.edu/TechnicalGPA/>): 2.0

TGPA is required for ECE courses (except ECE 316). See **Technical GPA (<https://go.grainger.illinois.edu/TechnicalGPA/>)** to clarify requirements.

Minimum Overall GPA: 2.0

Minimum hours required for graduation: 128 hours

General education: Students must complete the [Campus General Education requirements including the campus general education language requirement](#). ECE 445 or combination of ECE 496 & ECE 499 satisfies a design elective and the Campus General Education Advanced Composition requirement.

Orientation and Professional Development

Code	Title	Hours
ENG 100	Grainger Engineering Orientation Seminar (External transfer students take ENG 300 instead.)	1
Total Hours		1

Foundational Mathematics and Science

Code	Title	Hours
MATH 221	Calculus I (MATH 220 may be substituted. MATH 220 is appropriate for students with no background in calculus. 4 of 5 credit hours count towards degree.)	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257	Linear Algebra with Computational Applications	3
or MATH 416	Abstract Linear Algebra	
MATH 285	Intro Differential Equations	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
PHYS 213	Univ Physics: Thermal Physics	2
PHYS 214	Univ Physics: Quantum Physics	2
Total Hours		29

Computer Engineering Technical Core

Code	Title	Hours
ECE 110	Introduction to Electronics	3
ECE 120	Introduction to Computing	4
ECE 210	Analog Signal Processing	4
ECE 220	Computer Systems & Programming	4
CS 173	Discrete Structures (MATH 213 may be substituted.)	3
CS 225	Data Structures	4
ECE 313	Probability with Engrg Applic (STAT 410 may be substituted.)	3
ECE 374	Introduction to Algorithms & Models of Computation	4
ECE 385	Digital Systems Laboratory	3
ECE 391	Computer Systems Engineering	4
Total Hours		36

Technical Electives

Code	Title	Hours
From the Departmentally Approved List of Technical Electives (below) to include: at least 1 Electrical Engineering Foundations course, at least 3 Advanced Computing Electives, at least 1 Design Elective.		30
AE 202	Aerospace Flight Mechanics	3
AE 302	Aerospace Flight Mechanics II	3
AE 311	Incompressible Flow	3
AE 312	Compressible Flow	3
AE 321	Mechs of Aerospace Structures	3
AE 352	Aerospace Dynamical Systems	3
AE 353	Aerospace Control Systems	3
AE 402	Orbital Mechanics	3 or 4
AE 403	Spacecraft Attitude Control	3 or 4
AE 410	Computational Aerodynamics	3 or 4
AE 412	Viscous Flow & Heat Transfer	4
AE 416	Applied Aerodynamics	3 or 4
AE 419	Aircraft Flight Mechanics	3 or 4

AE 420	Finite Element Analysis	3 or 4	CHBE 422	Mass Transfer Operations	4
AE 428	Mechanics of Composites	3	CHBE 424	Chemical Reaction Engineering	3
AE 433	Aerospace Propulsion	3 or 4	CHBE 430	Unit Operations Laboratory	4
AE 434	Rocket Propulsion	3 or 4	CHBE 431	Process Design	4
AE 435	Electric Space Propulsion	3 or 4	CHBE 440	Process Control and Dynamics	3
AE 451	Aeroelasticity	3 or 4	CHBE 451	Transport Phenomena	3
AE 460	Aerodynamics & Propulsion Lab	2	CHBE 452		
Agri. Bio Eng. (ABE): all 300 and 400 level courses except 440. Exceptions for seminars and special topics will be reviewed in Advising Office.			CHBE 453	Electrochemical Engineering	2 or 3
ASTR 210	Introduction to Astrophysics	3	CHBE 456		
ASTR 310	Computing in Astronomy	3	CHBE 471	Biochemical Engineering	3 or 4
ASTR 330	Extraterrestrial Life	3	CHBE 472	Techniques in Biomolecular Eng	3 or 4
ASTR 350	The Big Bang, Black Holes, and the End of the Universe	3	CHBE 473	Biomolecular Engineering	3 or 4
ASTR 404	Stellar Astrophysics	3	CHBE 474	Metabolic Engineering	3 or 4
ASTR 405	Planetary Systems	3	CHEM 102	General Chemistry I	3
ASTR 406	Galaxies and the Universe	3	CHEM 103	General Chemistry Lab I	1
ASTR 414	Astronomical Techniques	4	CHEM 104	General Chemistry II	3
ATMS 201	General Physical Meteorology	3	CHEM 105	General Chemistry Lab II	1
ATMS 301	Atmospheric Thermodynamics	3	Chemistry (CHEM): All 200, 300 and 400 level courses except 397, 497, 499, and seminars and special topics, which may be reviewed in the Advising Office		
ATMS 302	Atmospheric Dynamics I	3	CEE 310	Transportation Engineering	3
ATMS 303	Synoptic-Dynamic Wea Analysis	4	CEE 330	Environmental Engineering	3
ATMS 304	Radiative Transfer-Remote Sens	3	CEE 408	Railroad Transportation Engrg	3 or 4
ATMS 305	Computing and Data Analysis	3	CEE 410	Railway Signaling & Control	3 or 4
ATMS 404	Risk Analysis in Earth Science	3 or 4	CEE 416	Traffic Capacity Analysis	3 or 4
ATMS 405	Boundary Layer Processes	4	CEE 430		
ATMS 406	Tropical Meteorology	4	CEE 447	Atmospheric Chemistry	4
ATMS 410	Radar Remote Sensing	4	CEE 491	Decision and Risk Analysis	3 or 4
ATMS 411	Satellite Remote Sensing	4	CPSC 265	Genetic Engineering Lab	3
ATMS 420	Atmospheric Chemistry	4	CS 101	Intro Computing: Engrg & Sci (By Approval)	3
ATMS 421	Earth Systems Modeling	4	CS 242	Programming Studio	3
ATMS 447	Climate Change Assessment	3	CS 357	Numerical Methods I	3
ATMS 449	Biogeochemical Cycles	4	CS 410	Text Information Systems	3 or 4
BIOC 406	Gene Expression & Regulation	3	CS 411	Database Systems	3 or 4
BIOC 446	Physical Biochemistry	3	CS 412	Introduction to Data Mining	3 or 4
BIOC 455	Technqs Biochem & Biotech	4	CS 413	Intro to Combinatorics	3 or 4
BIOE 201	Conservation Principles Bioeng	3	CS 414	Multimedia Systems	3 or 4
BIOE 202	Cell & Tissue Engineering Lab	2	CS 416	Data Visualization	3 or 4
BIOE 302	Modeling Human Physiology	3	CS 418	Interactive Computer Graphics	3 or 4
BIOE 414	Biomedical Instrumentation	3	CS 419	Production Computer Graphics	3 or 4
BIOE 415	Biomedical Instrumentation Lab	2	CS 420	Parallel Progrmg: Sci & Engrg	3 or 4
BIOE 461	Cellular Biomechanics	4	CS 421	Programming Languages & Compilers	3 or 4
BIOE 467	Biophotonics	3	CS 422	Programming Language Design	3 or 4
BIOE 476	Tissue Engineering	3	CS 423	Operating Systems Design	3 or 4
BIOE 480	Magnetic Resonance Imaging	3 or 4	CS 424	Real-Time Systems	3 or 4
BIOE 485	Computational Mathematics for Machine Learning and Imaging	4	CS 425	Distributed Systems	3 or 4
Biophysics (BIOP): All 400 level courses except seminars and special topics, which may be reviewed in the Advising Office			CS 426	Compiler Construction	3 or 4
CHBE 221	Principles of CHE	3	CS 427	Software Engineering I	3 or 4
CHBE 321	Thermodynamics	4	CS 428	Software Engineering II	3 or 4
CHBE 421	Momentum and Heat Transfer	4	CS 429	Software Engineering II, ACP	3
			CS 431	Embedded Systems	3 or 4
			CS 433	Computer System Organization	3 or 4

CS 435	Cloud Networking	3 or 4	ECE 418	Image & Video Processing	4
CS 436	Computer Networking Laboratory	3 or 4	ECE 419	Security Laboratory	3 or 4
CS 438	Communication Networks	3 or 4	ECE 420	Embedded DSP Laboratory	2
CS 439	Wireless Networks	3 or 4	ECE 422	Computer Security I	4
CS 440	Artificial Intelligence	3 or 4	ECE 424	Computer Security II	3 or 4
CS 445	Computational Photography	3 or 4	ECE 425	Intro to VLSI System Design	3
CS 446	Machine Learning	3 or 4	ECE 428	Distributed Systems	3 or 4
CS 447	Natural Language Processing	3 or 4	ECE 431	Electric Machinery	4
CS 450	Numerical Analysis	3 or 4	ECE 432		
CS 460	Security Laboratory	3 or 4	ECE 435	Computer Networking Laboratory	3 or 4
CS 461	Computer Security I	4	ECE 437	Sensors and Instrumentation	3
CS 463	Computer Security II	3 or 4	ECE 438	Communication Networks	3 or 4
CS 465	User Interface Design	4	ECE 439	Wireless Networks	3 or 4
CS 466	Introduction to Bioinformatics	3 or 4	ECE 441	Physcs & Modeling Semicond Dev	3
CS 467	Social Visualization	3 or 4	ECE 442	Silicon Photonics	3 or 4
CS 473	Algorithms	4	ECE 443	LEDs and Solar Cells	4
CS 475	Formal Models of Computation	3 or 4	ECE 444	IC Device Theory & Fabrication	4
CS 476	Program Verification	3 or 4	ECE 445	Senior Design Project Lab	4
CS 477	Formal Software Development Methods	3 or 4	ECE 446	Principles of Experimental Research in Electrical Engineering	4
CS 481	Advanced Topics in Stochastic Processes & Applications	3 or 4	ECE 447	Active Microwave Ckt Design	3
CS 484	Parallel Programming	3 or 4	ECE 448	Artificial Intelligence	3 or 4
CS 398	Special Topics (As approved)	1 to 4	ECE 451	Adv Microwave Measurements	3
CS 498	Special Topics (As approved)	1 to 4	ECE 452	Electromagnetic Fields	3
ECE 297	Individual Study	1	ECE 453	Wireless Communication Systems	4
ECE 304	Photonic Devices	3	ECE 454	Antennas	3
ECE 307	Techniques for Engrg Decisions	3	ECE 455	Optical Electronics	3 or 4
ECE 310	Digital Signal Processing	3	ECE 456	Global Nav Satellite Systems	4
ECE 311	Digital Signal Processing Lab	1	ECE 457	Microwave Devices & Circuits	3
ECE 314	Probability in Engineering Lab	1	ECE 458	Applic of Radio Wave Propag	3
ECE 329	Fields and Waves I	3	ECE 459	Communications Systems	3
ECE 330	Power Ckts & Electromechanics	3	ECE 460	Optical Imaging	4
ECE 333	Green Electric Energy	3	ECE 461	Digital Communications	3
ECE 340	Semiconductor Electronics	3	ECE 462	Logic Synthesis	3
ECE 342	Electronic Circuits	3	ECE 463	Digital Communications Lab	2
ECE 343	Electronic Circuits Laboratory	1	ECE 464	Power Electronics	3
ECE 350	Fields and Waves II	3	ECE 465		
ECE 365	Data Science and Engineering	3	ECE 466		
ECE 380	Biomedical Imaging	3	ECE 467	Biophotonics	3
ECE 395	Advanced Digital Projects Lab	2 or 3	ECE 468	Optical Remote Sensing	3
ECE 396	Honors Project	1 to 4	ECE 469	Power Electronics Laboratory	2
ECE 397	Individual Study in ECE	0 to 4	ECE 470	Introduction to Robotics	4
ECE 402	Electronic Music Synthesis	3	ECE 472	Biomedical Ultrasound Imaging	3
ECE 403	Audio Engineering	3	ECE 473	Fund of Engrg Acoustics	3 or 4
ECE 407	Cryptography	3 or 4	ECE 476	Power System Analysis	3
ECE 408	Applied Parallel Programming	4	ECE 478	Formal Software Development Methods	3 or 4
ECE 411	Computer Organization & Design	4	ECE 480	Magnetic Resonance Imaging	3 or 4
ECE 412			ECE 481	Nanotechnology	4
ECE 414	Biomedical Instrumentation	3	ECE 482	Digital IC Design	3
ECE 415	Biomedical Instrumentation Lab	2	ECE 483	Analog IC Design	3
ECE 416	Biosensors	3	ECE 485		
ECE 417	Multimedia Signal Processing	4	ECE 486	Control Systems	4

ECE 487	Intro Quantum Electr for EEs	3	IB 426	Env and Evol Physl of Animals	3
ECE 488	Compound Semicond & Devices	3	IB 427		
ECE 489	Robot Dynamics and Control	4	IB 431	Behavioral Ecology	3
ECE 490	Introduction to Optimization	3 or 4	IB 432	Genes and Behavior	3
ECE 491	Numerical Analysis	3 or 4	IB 440	Plants and Global Change	3
ECE 492	Parallel Progrmg: Sci & Engrg	3 or 4	IB 444	Insect Ecology	3 or 4
ECE 493	Advanced Engineering Math	3 or 4	IB 451	Conservation Biology	4
ECE 495	Photonic Device Laboratory	3	IB 452	Ecosystem Ecology	3
ECE 496	Senior Research Project	2	IB 453	Community Ecology	3
ECE 499	Senior Thesis	2	IB 461	Ornithology	4
ECE 298	Special Topics (As approved)	0 to 4	IB 462	Mammalogy	4
ECE 398	Special Topics in ECE (As approved)	0 to 4	IB 463	Ichthyology	4
ECE 498	Special Topics in ECE (As approved)	1 to 4	IB 464	Herpetology	4
ENG 491	Interdisciplinary Design Proj (CubeSat, Solar Decathlon, Formula SAE, Baja SAE or by approval)	1 to 4	IB 467	Principles of Systematics	4
GEOL 107	Physical Geology	4	IB 468	Insect Classification and Evol	4
GEOL 208	History of the Earth System	4	IB 471	Fungal Diversity and Ecology	4
GEOL 333	Earth Materials and the Env	4	IB 472		
GEOL 380	Environmental Geology	4	IB 473		
GEOL 411	Structural Geol and Tectonics	4	IB 481	Vector-borne Diseases	4
GEOL 417	Geol Field Methods, Western US	6	IB 482	Insect Pest Management	3
GEOL 432	Mineralogy and Mineral Optics	4	LING 300	Anat & Physiol Spch Mechanism	4
GEOL 436	Petrology and Petrography	4	LING 406	Introduction to Computational Linguistics	3 or 4
GEOL 440	Sedimentology and Stratigraphy	4	LING 407	Logic and Linguistic Analysis	3 or 4
GEOL 450	Investigating the Earth's Interior	3	LING 427	Language and the Brain	3 or 4
GEOL 452	Introduction to Geophysics	4	MSE 280	Engineering Materials	3
GEOL 460	Geochemistry	3	Material Science and Engineering (MSE): All 300 and 400 level courses except 304, 460, 461, and seminars/special topics, which may be reviewed by the Advising Office		
IE 310	Deterministic Models in Optimization	3	MATH 347	Fundamental Mathematics	3
IE 330	Industrial Quality Control	3	MATH 357	Numerical Methods I	3
IE 360	Facilities Planning and Design	3	MATH 402	Non Euclidean Geometry	3 or 4
IE 361	Production Planning & Control	3	MATH 403	Euclidean Geometry	3 or 4
IE 400	Design & Anlys of Experiments	3 or 4	MATH 412	Graph Theory	3 or 4
IE 410	Advanced Topics in Stochastic Processes & Applications	3 or 4	MATH 413	Intro to Combinatorics	3 or 4
IE 411	Optimization of Large Systems	3 or 4	MATH 414	Mathematical Logic	3 or 4
IE 412	OR Models for Mfg Systems	3 or 4	MATH 417	Intro to Abstract Algebra	3 or 4
IE 413	Simulation	3 or 4	MATH 418	Intro to Abstract Algebra II	3 or 4
IE 420	Financial Engineering	3 or 4	MATH 423	Differential Geometry	3 or 4
IE 430	Economic Found of Quality Syst	3 or 4	MATH 424	Honors Real Analysis	3
IE 431	Design for Six Sigma	3	MATH 425	Honors Advanced Analysis	3
IB 150	Organismal & Evolutionary Biol	4	MATH 427	Honors Abstract Algebra	3
IB 202	Physiology	3 or 4	MATH 428	Honors Topics in Mathematics	3
IB 203	Ecology	4	MATH 432	Set Theory and Topology	3 or 4
IB 204	Genetics	4	MATH 442	Intro Partial Diff Equations	3 or 4
IB 302	Evolution	4	MATH 444	Elementary Real Analysis	3 or 4
IB 335			MATH 446	Applied Complex Variables	3 or 4
IB 348	Fish and Wildlife Ecology	3	MATH 447	Real Variables	3 or 4
IB 368	Vertebrate Natural History	4	MATH 448	Complex Variables	3 or 4
IB 401	Introduction to Entomology	3 or 4	MATH 450	Numerical Analysis	3 or 4
IB 405	Evolution of Traits and Genomes	3	MATH 453	Number Theory	3 or 4
IB 420	Plant Physiology	3	MATH 473	Algorithms	4
IB 421	Photosynthesis	3	MATH 475	Formal Models of Computation	3 or 4

MATH 481	Vector and Tensor Analysis	3 or 4	ME 431	Mechanical Component Failure	3 or 4
MATH 482	Linear Programming	3 or 4	ME 440	Kinem & Dynamics of Mech Syst	3 or 4
MATH 484	Nonlinear Programming	3 or 4	ME 445	Introduction to Robotics	4
MATH 487	Advanced Engineering Math	3 or 4	ME 451	Computer-Aided Mfg Systems	3 or 4
MATH 489	Dynamics & Differential Eqns	3 or 4	ME 452	Num Control of Mfg Processes	3 or 4
MCB 150	Molecular & Cellular Basis of Life	4	ME 460	Industrial Control Systems	4
MCB 250	Molecular Genetics	3	ME 461	Computer Cntrl of Mech Systems	3 or 4
MCB 251	Exp Techniqs in Molecular Biol	2	ME 471	Finite Element Analysis	3 or 4
MCB 252	Cells, Tissues & Development	3	ME 472	Introduction to Tribology	3 or 4
MCB 253	Exp Techniqs in Cellular Biol	2	ME 485		
MCB 300	Microbiology	3	ME 487	MEMS-NEMS Theory & Fabrication	4
MCB 301	Experimental Microbiology	3	MUS 407	Elect Music Techniques I	3
MCB 314	Introduction to Neurobiology	3	MUS 409	Elec Music Techniques II	2
MCB 316	Genetics and Disease	4	NEUR 453	Cog Neuroscience of Vision	3 or 4
MCB 354	Biochem & Phys Basis of Life	3	NPRE 201	Energy Systems	2 or 3
MCB 400	Cancer Cell Biology	3	NPRE 247	Modeling Nuclear Energy System	3
MCB 401	Cellular Physiology	3	NPRE 330	Materials in Nuclear Engineering	3
MCB 402	Sys & Integrative Physiology	3	NPRE 402	Nuclear Power Engineering	3 or 4
MCB 403			NPRE 412	Nuclear Power Econ & Fuel Mgmt	3 or 4
MCB 404			NPRE 421	Plasma and Fusion Science	3
MCB 406	Gene Expression & Regulation	3	NPRE 423	Plasma Laboratory	2
MCB 408	Immunology	3	NPRE 429	Plasma Engineering	3
MCB 410	Developmental Biology, Stem Cells and Regenerative Medicine	3	NPRE 432	Nuclear Engrg Materials Lab	2
MCB 413	Endocrinology	3	NPRE 435	Radiological Imaging	3
MCB 419	Brain, Behavior & Info Process	3	NPRE 441	Radiation Protection	4
MCB 421	Microbial Genetics	3	NPRE 442	Radioactive Waste Management	3
MCB 424	Microbial Biochemistry	3	NPRE 448	Nuclear Syst Engrg & Design	4
MCB 426	Bacterial Pathogenesis	3	NPRE 451	NPRE Laboratory	3
MCB 430	Molecular Microbiology	3	NPRE 455	Neutron Diffusion & Transport	4
MCB 431	Microbial Physiology	3	NPRE 457	Safety Anlys Nucl Reactor Syst	3 or 4
MCB 433	Virology & Viral Pathogenesis	3	NPRE 458	Design in NPRE	4
MCB 435	Evolution of Infectious Disease	3	NPRE 470		
MCB 446	Physical Biochemistry	3	NPRE 475		
MCB 480	Eukaryotic Cell Signaling	3	PHYS 225	Relativity & Math Applications	2
ME 200	Thermodynamics	3	PHYS 325	Classical Mechanics I	3
ME 310	Fundamentals of Fluid Dynamics	4	PHYS 326	Classical Mechanics II	3
ME 320	Heat Transfer	4	PHYS 401	Classical Physics Lab	3
ME 330	Engineering Materials	4	PHYS 402	Light	3 or 4
ME 340	Dynamics of Mechanical Systems	3.5	PHYS 403	Modern Experimental Physics	4 or 5
ME 370	Mechanical Design I	3	PHYS 406		
ME 371	Mechanical Design II	3	PHYS 419	Space, Time, and Matter-ACP	3 or 4
ME 400	Energy Conversion Systems	3 or 4	PHYS 420	Space, Time, and Matter	2
ME 401	Refrigeration and Cryogenics	3 or 4	PHYS 427	Thermal & Statistical Physics	4
ME 402	Design of Thermal Systems	3 or 4	PHYS 460	Condensed Matter Physics	4
ME 403	Internal Combustion Engines	3 or 4	PHYS 466	Atomic Scale Simulations	3 or 4
ME 404	Intermediate Thermodynamics	4	PHYS 470	Subatomic Physics	4
ME 410	Intermediate Gas Dynamics	3 or 4	PHYS 485	Atomic Phys & Quantum Theory	3
ME 411	Viscous Flow & Heat Transfer	4	PHYS 486	Quantum Physics I	4
ME 412	Numerical Thermo-Fluid Mechs	2 to 4	PHYS 487	Quantum Physics II	4
ME 420	Intermediate Heat Transfer	4	PSYC 204	Intro to Brain and Cognition	3
ME 430	Failure of Engrg Materials	3 or 4	SHS 200	General Phonetics	3
			SHS 240	Intro Sound & Hearing Science	3

SHS 300	Anat & Physiol Spch Mechanism	4	CS 441	Applied Machine Learning	3 or 4
SHS 301	General Speech Science	4	CS 444	Deep Learning for Computer Vision	3 or 4
SHS 320	Development of Spoken Language	3	CS 446	Machine Learning	3 or 4
SHS 450	Intro Audiol & Hear Disorders	4	CS 450	Numerical Analysis	3 or 4
SHS 470	Neural Bases Spch Lang	3	CS 461	Computer Security I	4
STAT 420	Methods of Applied Statistics	3 or 4	CS 475	Formal Models of Computation	3 or 4
STAT 424	Design of Experiments	3 or 4	CS 476	Program Verification	3 or 4
STAT 425	Statistical Modeling I	3 or 4	CS 477	Formal Software Development Methods	3 or 4
STAT 428	Statistical Computing	3 or 4	CS 483	Applied Parallel Programming	4
STAT 429	Time Series Analysis	3 or 4	ECE 408	Applied Parallel Programming	4
STAT 440	Statistical Data Management	3 or 4	ECE 411	Computer Organization & Design	4
SE 411	Reliability Engineering	3 or 4	ECE 412		
SE 420	Digital Control Systems	4	ECE 419	Security Laboratory	3 or 4
SE 423	Mechatronics	3	ECE 422	Computer Security I	4
SE 424	State Space Design for Control	3	ECE 424	Computer Security II	3 or 4
TAM 211	Statics	3	ECE 425	Intro to VLSI System Design	3
TAM 212	Introductory Dynamics	3	ECE 428	Distributed Systems	3 or 4
TAM 251	Introductory Solid Mechanics	3	ECE 435	Computer Networking Laboratory	3 or 4
TAM 324	Behavior of Materials	4	ECE 438	Communication Networks	3 or 4
TAM 335	Introductory Fluid Mechanics	4	ECE 439	Wireless Networks	3 or 4
TAM 412	Intermediate Dynamics	4	ECE 448	Artificial Intelligence	3 or 4
TAM 435	Intermediate Fluid Mechanics	4	ECE 462	Logic Synthesis	3
TAM 445	Continuum Mechanics	4	ECE 470	Introduction to Robotics	4
TAM 451	Intermediate Solid Mechanics	4	ECE 478	Formal Software Development Methods	3 or 4
Select one course from the following list of Electrical Engineering Foundations Courses:			ECE 479	IoT and Cognitive Computing	4
ECE 310	Digital Signal Processing	3	ECE 484	Principles of Safe Autonomy	4
ECE 330	Power Ckts & Electromechanics	3	ECE 491	Numerical Analysis	3 or 4
ECE 329	Fields and Waves I	3	ECE 492	Parallel Progrmg: Sci & Engrg	3 or 4
ECE 340	Semiconductor Electronics	3	Select one course from departmentally approved Design Elective list below:		
ECE 461	Digital Communications	3	ECE 411	Computer Organization & Design	4
ECE 486	Control Systems	4	ECE 445	Senior Design Project Lab	4
Select three courses from the following list of Advanced Computing Electives:			ECE 496	Senior Research Project	4
CS 357	Numerical Methods I	3	& ECE 499	and Senior Thesis	
CS 411	Database Systems	3 or 4	Free Electives		
CS 412	Introduction to Data Mining	3 or 4	Code	Title	Hours
CS 414	Multimedia Systems	3 or 4	Additional course work, subject to the Grainger College of Engineering restrictions to Free Electives, so that there are at least 128 credit hours earned toward the degree. (https://go.grainger.illinois.edu/FreeElectives/)		
CS 418	Interactive Computer Graphics	3 or 4	Total Hours of Curriculum to Graduate 128		
CS 419	Production Computer Graphics	3 or 4	<i>for the degree of Bachelor of Science in Computer Engineering</i>		
CS 420	Parallel Progrmg: Sci & Engrg	3 or 4	<hr/>		
CS 421	Programming Languages & Compilers	3 or 4	Sample Sequence		
CS 423	Operating Systems Design	3 or 4	<i>This sample sequence is intended to be used only as a guide for degree completion. All students should work individually with their academic advisors to decide the actual course selection and sequence that works best for them based on their academic preparation and goals. Enrichment programming such as study abroad, minors, internships, and so on may impact the structure of this four-year plan. Course availability is not guaranteed during the semester indicated in the sample sequence. The</i>		
CS 424	Real-Time Systems	3 or 4			
CS 425	Distributed Systems	3 or 4			
CS 426	Compiler Construction	3 or 4			
CS 431	Embedded Systems	3 or 4			
CS 434	Real World Algorithms for IoT and Data Science	3 or 4			
CS 436	Computer Networking Laboratory	3 or 4			
CS 437	Topics in Internet of Things	3 or 4			
CS 438	Communication Networks	3 or 4			
CS 440	Artificial Intelligence	3 or 4			

curriculum sequence can also be viewed via dynamic and static curricular maps (<https://grainger.illinois.edu/academics/undergraduate/majors-and-minors/ce-map/>), which include prerequisite sequencing.

Students must fulfill their Language Other Than English requirement by successfully completing a third level of a language other than English.

See the corresponding section on the Degree and General Education Requirements (<http://catalog.illinois.edu/general-information/degree-general-education-requirements/>). ECE 445 or combination of ECE 496 & ECE 499 satisfies a technical core requirement and the Campus General Education Advanced Composition requirement. If ECE 411 is selected as the design course, a separate Advanced Composition course also needs to be selected.

Free Electives: Additional course work, subject to the Grainger College of Engineering restrictions to Free Electives (<https://go.grainger.illinois.edu/FreeElectives/>), so that there are at least 128 credit hours earned toward the degree.

First Year

First Semester	Hours
ECE 120	4
ENG 100	1
MATH 221 (MATH 220 may be substituted)	4
Language Other Than English (3rd level)	4
Composition I or General Education course (Choose a Humanities or Social/Behavioral Science course)	4
	17

Total Hours 17

First Year

Second Semester	Hours
ECE 110	3
ECE 220	4
MATH 231	3
PHYS 211	4
General Education course (Choose a Humanities or Social/Behavioral Science course) or General Education course	3
	17

Total Hours 17

Second Year

First Semester	Hours
CS 173	3
MATH 257	3
MATH 241	4
PHYS 212	4

General Education course (Choose a Humanities or Social/Behavioral Science course with a Cultural Studies designation)	3
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17

Total Hours 17

Second Year

Second Semester	Hours
ECE 210	4
CS 225	4
MATH 285	3
PHYS 213	2
PHYS 214	2
	15

Total Hours 15

Third Year

First Semester	Hours
ECE 313	3
ECE 385	3
Technical Elective course	3
General Education course (Choose a Humanities or Social/Behavioral Science course with a Cultural Studies designation)	3
Free Elective course	3
	15

Total Hours 15

Third Year

Second Semester	Hours
ECE 391	4
Technical Elective course	3
Technical Elective course	4
General Education course (Choose a Humanities or Social/Behavioral Science course with a Cultural Studies designation)	3
Free Elective course	3
	17

Total Hours 17

Fourth Year

First Semester	Hours
ECE 374	4
Technical Elective course	3
Technical Elective course	4
Free Elective course	3
	14

Total Hours 14

Fourth Year

Second Semester	Hours
Design Elective course	4
Technical Elective course	3
Technical Elective course	3
Technical Elective course	3
Free Elective course	3
	16

Total Hours 16**Total Hours: 128***for the degree of Bachelor of Science Major in Computer Engineering*

Student learning outcomes are based on learning outcomes in line with the ABET accreditation process.

Computer Engineering graduates will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

*for the degree of Bachelor of Science in Computer Engineering***Electrical & Computer Engineering Website**

Electrical & Computer Engineering Faculty (<https://ece.illinois.edu/about/directory/faculty/>)

The Grainger College of Engineering Admissions (<https://grainger.illinois.edu/admissions/>)

The Grainger College of Engineering