INDUSTRIAL ENGINEERING, BS

for the degree of Bachelor of Science in Industrial Engineering

---

Industrial engineering is a discipline that encompasses the analysis, development, improvement, implementation, and evaluation of integrated systems and their components, including materials, information, energy, people, money, time, equipment, and associated processes. Industrial engineering draws upon a variety of disciplines, from mathematics to psychology, from communications to computer science, and from production management to process control. Industrial engineers design efficient, productive systems in a wide range of business, industrial, and governmental settings.

The technical portion of the Industrial Engineering curriculum is designed as a sequence of increasingly specialized experiences. The entering student's first year is spent mastering the basics of science: math, chemistry, and physics. Second-year students begin to take fundamental engineering courses such as statics, dynamics, statistics, and strength of materials. Third-year students take a core of industrial engineering courses and begin their chosen area of specialization in one of five tracks, including: Operations Research; Quality Engineering; Supply Chain, Manufacturing, and Logistics; Economics and Finance; and Industrial Engineering Fundamentals. The Track Option website (https://ise.illinois.edu/undergraduate/industrial-engineering-degree/industrial-engineering-track-options/) contains a full list of courses for each track option. During their senior year, students broaden and deepen their knowledge with additional technical elective courses. Engineering design, communication, teamwork, and laboratory experiences are integrated throughout all four years of the curriculum.

Track Options:

- Economics and Finance
- Human Factors/Ergonomics
- Industrial Engineering Fundamentals
- Operations Research
- Quality Engineering
- Supply Chain, Manufacturing, and Logistics

The capstone experience for Industrial Engineering undergraduates is the Senior Project Course. Students work collaboratively with industry and a team of faculty members on a real-world problem during their final semester. Students participate in the practice of engineering through the capstone senior design course in which they work in teams to solve problems submitted by industry partnering companies, and present their solutions in reports and presentations supported by complete economic analyses.

Current Program Educational Objectives

for the degree of Bachelor of Science in Industrial Engineering

Graduation Requirements

Minimum hours required for graduation: 128 hours.

Minimum Overall GPA: 2.0

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

University Requirements

Minimum of 40 hours of upper-division coursework, generally at the 300- or 400-level. These hours can be drawn from all elements of the degree. Students should consult their academic advisor for additional guidance in fulfilling this requirement.

The university and residency requirements can be found in the Student Code (https://studentcode.illinois.edu/article3/part8/3-801/) (§ 3-801) and in the Academic Catalog (http://catalog.illinois.edu/general-information/degree-general-education-requirements/).

General Education Requirements

Follows the campus General Education (Gen Ed) requirements (https://courses.illinois.edu/gened/DEFAULT/DEFAULT/). Some Gen Ed requirements may be met by courses required and/or electives in the program.

Code	Title	Hours
Composition I		4-6
Advanced Composition		3
Fulfilled by SE 494		
Humanities & the Arts (6 hours)		6
Natural Sciences & Technology (6 hours)		6
fulfilled by CHEM 102, PHYS 211, PHYS 212		
Social & Behavioral Sciences (6 hours)		6
fulfilled by ECON 102 or ECON 103 and any other course approved as Social & Behavioral Sciences		
Cultural Studies: Non-Western Cultures (1 course)		3
Cultural Studies: US Minority Cultures (1 course)		3
Cultural Studies: Western/Comparative Cultures (1 course)		3
Quantitative Reasoning (2 courses, at least one course must be Quantitative Reasoning I)		6-10
fulfilled by MATH 220 or MATH 221; and MATH 231, MATH 241, MATH 285, PHYS 211, PHYS 212; and CS 101 or CS 124		
Language Requirement (Completion of the third semester or equivalent of a language other than English is required)		0-15

Major Requirements

Orientation and Professional Development

Code	Title	Hours
ENG 100	Grainger Engineering Orientation Seminar (External transfer students take ENG 300.)	1
SE 100	Introduction to ISE	1
SE 290	ISE Undergraduate Seminar	0
Total Hours		**2**

Introductory Economics Elective

Code	Title	Hours
ECON 102	Microeconomic Principles	3
or ECON 103	Macroeconomic Principles	
Total Hours		**3**

Foundational Mathematics and Science

Code	Title	Hours
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
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
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
Total Hours		**31**

Industrial Engineering Technical Core

Code	Title	Hours
CS 101	Intro Computing: Engrg & Sci (CS 124 may be substituted.)	3
ECE 110	Introduction to Electronics	3
IE 300	Analysis of Data	3
IE 310	Deterministic Models in Optimization	3
IE 360	Facilities Planning and Design	3
IE 361	Production Planning & Control	3
IE 370	Stochastic Processes and Applications	3
IE 371	Simulation Modeling with Applications for Industrial Engineering	3
IE 400	Design & Anlys of Experiments	3
ME 330	Engineering Materials	4
SE 101	Engineering Graphics & Design	3
SE 261	Business Side of Engineering	2
SE 494	Senior Engineering Project I	3
SE 495	Senior Engineering Project II	2
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
TAM 251	Introductory Solid Mechanics	3
Total Hours		**50**

Track Option Electives

Code	Title	Hours
Track options include courses selected from departmentally approved lists. Courses on these elective lists may only be used to fulfill one curricular requirement.		**12**

Computational Methods in IE

Track Core requirement - complete 2 courses:

Code	Title	Hours
CS 173	Discrete Structures	3
CS 225	Data Structures	4
Track Electives - select remaining courses from this list:		
All 200-, 300-, and 400-level CS courses excluding CS 210, CS 211, CS 397, CS 398, and CS seminar and senior project courses.		
SE 400	Engineering Law	3 or 4

Economics and Finance (E&F)

Track Core - complete 2 courses from this list:		
ACE 427	Commodity Price Analysis	3
IE 420	Financial Engineering	3
SE 450	Decision Analysis I	3
Track Electives - select remaining courses from this list of courses. Of these courses, only 1 selected may be at the 100 or 200 level:		
ACE 410	Energy Economics and Policy	3
ACE 427	Commodity Price Analysis	3
ACE 428	Commodity Futures and Options	3
ACCY 200	Fundamentals of Accounting	3
ECON 302	Inter Microeconomic Theory	3
ECON 303	Inter Macroeconomic Theory	3
ECON 420	International Economics	2 to 4
ECON 471	Intro to Applied Econometrics	2 to 4
FIN 221	Corporate Finance	3
FIN 300	Financial Markets	3
FIN 411	Investment & Portfolio Mngt	3
FIN 412	Options and Futures Markets	3
FIN 415	Fixed Income Portfolios	3
FIN 461	Banking and Financial Regulation	3
SE 400	Engineering Law	3 or 4

Human Factors — **12**

Track Core - complete the following course:		
IE 340	Human Factors	4
Track Electives - complete at least 3 of the following courses:		
Physical Ergonomics Focus		
BIOE 461	Cellular Biomechanics	4
or TAM 461	Cellular Biomechanics	
ETMA 421	Industrial and Agricultural Safety-Injury Prevention	3
ETMA 422	Industrial and Agricultural Occupational Illness Prevention	3
ETMA 425	Managing Industrial and Agricultural Safety Risks	3
HK 353	Biomechanics of Human Movement	3
HK 466	Measure & Eval in Kinesiology	3 or 4
ME 481	Whole-Body Musculoskel Biomech	3 or 4
ME 482	Musculoskel Tissue Mechanics	3 or 4
Cognitive Ergonomics Focus		
SE 400	Engineering Law	3 or 4
SE 450	Decision Analysis I	3 or 4
IE 445	Human Performance and Cognition in Context	3 or 4
Organizational Ergonomics Focus		

ANTH 411	Research Methods in Socio-Cultural Anthropology	3 or 4
BADM 310	Mgmt and Organizational Beh	3
BADM 312	Designing and Managing Orgs	3
BADM 357	Digital Making Seminar	3
HK 403	Technology, Health, and Aging	3 or 4
PSYC 245	Industrial Org Psych	3
Optional Health Focus		

Industrial Engineering Fundamentals (IEF)

Track Core - complete the following 4 courses:

IE 330	Industrial Quality Control	3
IE 411	Optimization of Large Systems	3
IE 412	OR Models for Mfg Systems	3
IE 340	Human Factors	4
SE 400	Engineering Law	3 or 4

Operations Research (OR)

Track Core - complete the following 2 courses:

IE 410	Advanced Topics in Stochastic Processes & Applications	3
IE 411	Optimization of Large Systems	3

Track Electives - complete 2 courses from this list:

ECE 490	Introduction to Optimization	3
IE 420	Financial Engineering	3
MATH 444	Elementary Real Analysis	3-4
or MATH 447	Real Variables	
MATH 484	Nonlinear Programming	3 or 4
SE 400	Engineering Law	3 or 4
SE 411	Reliability Engineering	3
STAT 410	Statistics and Probability II	3
or MATH 464	Statistics and Probability II	
STAT 420/ASRM 450	Methods of Applied Statistics	3
STAT 424	Design of Experiments	3
STAT 425	Statistical Modeling I	3

Quality Engineering (QE)

Track Core - complete the following course:

IE 330	Industrial Quality Control	3

Track Core Elective - complete at least 1 of the following courses:

IE 431	Design for Six Sigma	3
SE 400	Engineering Law	3 or 4
SE 411	Reliability Engineering	3

Track Elective- complete remaining courses from this list:

STAT 410/MATH 464	Statistics and Probability II	3
STAT 420/ASRM 450	Methods of Applied Statistics	3
STAT 424	Design of Experiments	3
STAT 426	Statistical Modeling II	3

Supply Chain, Manufacturing and Logistics (SC&L)

Track Core - complete the following course:

IE 412	OR Models for Mfg Systems	3

Track Electives - complete 3 of the following courses:

ECE 470	Introduction to Robotics	4
IE 330	Industrial Quality Control	3
ME 270	Design for Manufacturability	3
ME 451	Computer-Aided Mfg Systems	3
ME 452	Num Control of Mfg Processes	3
SE 400	Engineering Law	3 or 4

Technical Electives

Code	Title	Hours
Courses on these elective lists may only be used to fulfill one curricular requirement.		
Computer science elective selected from the departmentally approved list of Computer Science Electives below:		**3**
CS 225	Data Structures	4
CS 357	Numerical Methods I	3
CS 411	Database Systems	3
CS 450	Numerical Analysis	3
IE 405	Computing for ISE	3
IE technical electives selected from the departmentally approved list of IE Technical Electives below:		**3**
IE 330	Industrial Quality Control	3
IE 340	Human Factors	4
IE 411	Optimization of Large Systems	3
IE 412	OR Models for Mfg Systems	3
IE 420	Financial Engineering	3
IE 431	Design for Six Sigma	3
IE 445	Human Performance and Cognition in Context	3
SE 310	Design of Structures and Mechanisms	3
SE 320	Control Systems	4
SE 424	State Space Design for Control	3

Free Electives

Code	Title	Hours
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/)		11
Total Hours of Curriculm to Graduate		**128**

for the degree of Bachelor of Science in Industrial Engineering

Sample Sequence

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 curriculum sequence can also be viewed via dynamic and static curricular maps (https://grainger.illinois.edu/academics/undergraduate/majors-and-minors/industrial-engineering-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/). One of the SBS courses must be an introductory economics course (ECON 102 or ECON 103). SE 494 and SE 495 will satisfy a core course requirement and the Campus General Education Advanced Composition requirement.*

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
SE 100	1
MATH 221 (MATH 220 may be substituted)	4
CHEM 102	3
CHEM 103	1
ENG 100	1
Composition I or SE 101	4
	14

Total Hours 14

First Year

Second Semester	Hours
CS 101 (CS 124 may be substituted)	3
MATH 231	3
PHYS 211	4
ECE 110	3
SE 101 (or Composition I)	3
	16

Total Hours 16

Second Year

First Semester	Hours
SE 261	2
MATH 241	4
PHYS 212	4
TAM 211	3
ECON 102 or 103	3
	16

Total Hours 16

Second Year

Second Semester	Hours
IE 300	3
MATH 285	3
PHYS 213	2
TAM 212	3
TAM 251	3
SE 290	0

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

Total Hours 17

Third Year

First Semester	Hours
IE 310	3
MATH 257	3
IE 360	3
ME 330	4
General Education course (Choose a Humanities or Social/ Behavioral Science course with Cultural Studies designation)	3
	16

Total Hours 16

Third Year

Second Semester	Hours
IE 361	3
IE 370	3
Track Option course	3
Track Option course	3
IE Technical Elective course	3
	15

Total Hours 15

Fourth Year

First Semester	Hours
IE 400	3
Track Option course	3
SE 494 & SE 495 or Language Other Than English (3rd level)	5
Computer Science Elective course	3
General Education course (Choose a Humanities or Social/ Behavioral Science course with Cultural Studies designation)	3
	17

Total Hours 17

Fourth Year

Second Semester	Hours
IE 371	3
Language Other Than English (3rd level) or SE 494 & SE 495	4
Track Option course	3
Free Elective course	4
Free Elective course	3
	17

Total Hours 17

Information listed in this catalog is current as of 03/2026

Total Hours: 128

for the degree of Bachelor of Science in Industrial Engineering

---

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

Industrial 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 Industrial Engineering

---

Industrial & Enterprise Systems Website (https://ise.illinois.edu/directory/faculty.html)
Industrial & Enterprise Systems Faculty

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