Industrial Engineering, BSE

Requirements

The Bachelor of Science in Engineering (BSE) with a major in industrial engineering requires a minimum of 128 s.h. of credit, including two 0 s.h. departmental seminars. At the time of graduation, students must have a cumulative grade-point average of at least 2.00 in all college work used to complete degree requirements and in all UI coursework in order to be awarded the BSE.

All BSE students are required to take the same collegiate curriculum. For information about these collegiate requirements, see the Bachelor of Science in Engineering, BSE in the catalog. 6 s.h. of a student's major courses fulfill the basic science or college-level math collegiate requirement. Students completing the major in industrial engineering fulfill the collegiate statistics requirement by completing STAT:2020 Probability and Statistics for the Engineering and Physical Sciences. Students within the department are also required to take PSY:1001 Elementary Psychology to fulfill part of the BSE collegiate curriculum general education component approved course subjects requirement.

The BSE with a major in industrial engineering requires the following coursework.

Requirements	Hours
Collegiate Curriculum	49
Basic Science and College-Level Math, from Major Requirements or Focus Area	6
Major Requirements (includes two 0 s.h. seminars)	52
Focus Area	22

Major Requirements

Major requirements include a set of common courses (40 s.h.), at least 11 s.h. in engineering fundamentals elective courses, a systems elective (3 s.h.), two departmental seminars (0 s.h.), and one capstone design course (4 s.h.).

Common Courses

Course #	Title	Hours
All of these:		
ISE:2360	Design for Manufacturing	3
ISE:2500	Engineering Economy	3
ISE:3300	Manufacturing Systems	3
ISE:3350	Process Engineering	3
ISE:3400	Human Factors	3
ISE:3450	Ergonomics	3
ISE:3500	Information Systems Design	3
ISE:3600	Quality Control	3
ISE:3610	Stochastic Modeling	3
ISE:3660	Data Analytics With R	3
ISE:3700	Operations Research	3
ISE:3750	Digital Systems Simulation	3
PHYS:1612	Introductory Physics II (with lab)	4

Engineering Fundamentals

Students who are required to complete ENGR:2730 Computers in Engineering as part of their focus area must select a different course to fulfill the engineering fundamentals requirement.

Course #	Title	Hours
At least 11 s.h. from these:		
BME:2710	Engineering Drawing, Design, and Solid Modeling	3
CBE:2040	Environment, Energy, and Climate Change	3
ECE:2400	Linear Systems I (P: ENGR:2120 and MATH:2560)	3
ECE:2410	Principles of Electronic Instrumentation (P: ENGR:2120, PHYS:1612, MATH:2560)	4
ENGR:2110	Statics	2
ENGR:2120	Electrical Circuits	3
ENGR:2130	Thermodynamics	3
ENGR:2710	Dynamics	3
ENGR:2720	Materials Science	3
ENGR:2730	Computers in Engineering	3
ENGR:2750	Mechanics of Deformable Bodies	3
ENGR:3110	Introduction to Artificial Intelligence and Machine Learning in Engineering	3

Systems Elective

Students who complete ENGR:2730 Computers in Engineering or ISE:4900 Introduction to Six Sigma as part of their focus area must select a different course to fulfill their systems elective or work with their academic advisor for an appropriate substitution.

Course #	Title	Hours
One of these:		
ISE:4172	Big Data Analytics	3
ISE:4175	Safety Engineering	3
ISE:4900	Introduction to Six Sigma	3
ENGR:2730	Computers in Engineering	3
An industrial and systems engineering course (prefix ISE) numbered 5000 or above		3

Departmental Seminars

Course #	Title	Hours
Both of these:		
ISE:2000	Industrial Engineering Sophomore Seminar	0
ISE:3000	Professional Seminar: Industrial Engineering (taken in the third year)	0

Capstone Design Course

Course #	Title	Hours
This course:		
ISE:4600	Industrial Engineering Design Project	4

Focus Area

Students must select focus area courses according to guidelines established by the Department of Industrial and Systems Engineering. Focus areas include big data analytics [p. 2], computer and information systems [p. 2], design and manufacturing [p. 2], entrepreneurship [p. 3], human factors and ergonomics [p. 3], management [p. 4], and an option to tailor a focus area to an individual student's interests. For more information about focus area options and guidelines for tailored focus areas, see Focus Areas on the Department of Industrial and Systems Engineering website.

Focus areas in the industrial engineering major include content area courses and electives; carefully selected elective courses may contribute to earning a minor and/or certificate.

Big Data Analytics

Students in the big data analytics focus area complete four required courses (12 s.h.), two focus area electives (at least 6 s.h.), and one math or science elective (at least 3 s.h.).

Required Big Data Analytics Courses

Course #	Title	Hours
One of these:		
BAIS:3500	Data Mining	3
ECE:5450/IGPI:5450	Machine Learning	3
All of these:		
ENGR:2730	Computers in Engineering	3
STAT:4540/ BAIS:4540/ DATA:4540/ IGPI:4540	Statistical Learning	3
STAT:4580/ DATA:4580/ IGPI:4580	Data Visualization and Data Technologies	3

Big Data Analytics Electives

Course #	Title	Hours
Two of these:		
ISE:4172	Big Data Analytics	3
CS:2210	Discrete Structures	3
CS:2230	Computer Science II: Data Structures	4
CS:5110/IGPI:5110	Introduction to Informatics	3
ECE:3330/IGPI:3330	Introduction to Software Design	3
STAT:4740/ CS:4740/IGPI:4740/ MATH:4740	Large Data Analysis	3

Math or Science Elective–Big Data Analytics

Course #	Title	Hours
One of these:		
BIOL:1411	Foundations of Biology	4
CHEM:1120	Principles of Chemistry II	4
MATH:3550	Engineering Vector Calculus	3
MATH:3800/ CS:3700	Introduction to Numerical Methods	3
PHYS:2704	Physics IV (with or without lab)	3-4
STAT:3210	Experimental Design and Analysis	3

Computer and Information Systems

Students in the computer and information systems focus area complete five required courses (16 s.h.) and two focus area electives (at least 6 s.h.).

Required Computer and Information Systems Courses

Course #	Title	Hours
All of these:		
CS:2210	Discrete Structures	3
CS:2230	Computer Science II: Data Structures	4
ECE:3330/IGPI:3330	Introduction to Software Design	3
ENGR:2730	Computers in Engineering	3
MATH:3800/ CS:3700	Introduction to Numerical Methods	3

Computer and Information Systems Electives

Students in this focus area who wish to receive the minor in computer science must take CS:3330 Algorithms and CS:3210 Programming Languages and Tools or CS:3980 Topics in Computer Science I.

Course #	Title	Hours
Two of these:		
CS:2630	Computer Organization	4
CS:3210	Programming Languages and Tools	3
CS:3330	Algorithms	3
CS:3820	Programming Language Concepts	3
CS:3980	Topics in Computer Science I	3
CS:4400	Database Systems	3
CS:5800/ECE:5800	Fundamentals of Software Engineering	3

Design and Manufacturing

Students in the design and manufacturing focus area complete two required courses (6 s.h.), three focus area electives (at least 9 s.h.), one math or science elective (at least 3 s.h.), and one advanced engineering elective (at least 3 s.h.).

Required Design and Manufacturing Courses

Course #	Title	Hours
Both of these:		
ARTS:1020	Elements of 3D Design	3
TDSN:2240/ CEE:2240	Drafting and Modeling With AutoCAD and Rhino	3

Design and Manufacturing Electives

Course #	Title	Hours
Three of these:		
ISE:4116/ME:4116	Manufacturing Processes Simulations and Automation	3
ISE:4900	Introduction to Six Sigma	3

ISE:5310	Advanced Computational Design and Manufacturing	3
ISE:5620	Design of Experiments	3
ISE:5650	Mechatronics Engineering for Smart Device Design	3
BME:2500	Biomaterials and Biomechanics	4
BME:2710	Engineering Drawing, Design, and Solid Modeling	3
BME:5101	Biomaterials and Implant Design	3
ME:4112/CEE:4512	Engineering Design Optimization	3
ME:5167/CEE:5137	Composite Materials	3
MTLS:3285	Fabrication and Design: Hand-Made Bicycle	4
MTLS:4910	Mixed Media and Professional Practices	3-4
TDSN:2250	Digital Prototyping	3
TDSN:3200	Product Design	4

Math or Science Elective–Design and Manufacturing

Course #	Title	Hours
One of these:		
BIOL:1411	Foundations of Biology	4
CHEM:1120	Principles of Chemistry II	4
MATH:3550	Engineering Vector Calculus	3
MATH:3800/ CS:3700	Introduction to Numerical Methods	3
PHYS:2704	Physics IV (with or without lab)	3-4

Advanced Engineering Elective–Design and Manufacturing

Students select one course numbered 3000 or above from any department in the College of Engineering (prefix BME, CBE, CEE, ECE, ISE, or ME), excluding department seminars.

Entrepreneurship

Students in the entrepreneurship focus area complete three required courses (9 s.h.), two technological entrepreneurship courses (6 s.h.), one advanced elective (3 s.h.), and one math or science elective (at least 3 s.h.).

Required Entrepreneurship Courses

Course #	Title	Hours
All of these:		
ISE:4900	Introduction to Six Sigma	3
ENTR:2000	Entrepreneurship and Innovation	3
ENTR:3100	Entrepreneurial Finance	3

Technological Entrepreneurship Certificate Courses

Students select two courses that count toward the Certificate in Technological Entrepreneurship for a total of 6 s.h.

Advanced Elective

Course #	Title	Hours
One of these:		
A course numbered 3000 or above in biomedical engineering (prefix BME), chemical and biochemical engineering (prefix CBE), civil and environmental engineering (prefix CEE), electrical and computer engineering (prefix ECE), industrial and systems engineering (prefix ISE), or mechanical engineering (prefix ME)		3
A course numbered 3000 or above in accounting (prefix ACCT), business analytics and information systems (prefix BAIS), business (prefix BUS), economics (prefix ECON), entrepreneurship (prefix ENTR), finance (prefix FIN), management (prefix MGMT), or marketing (prefix MKTG)		3

Math or Science Elective–Entrepreneurship

Course #	Title	Hours
One of these:		
BIOL:1411	Foundations of Biology	4
CHEM:1120	Principles of Chemistry II	4
MATH:3550	Engineering Vector Calculus	3
MATH:3800/ CS:3700	Introduction to Numerical Methods	3
PHYS:2704	Physics IV (with or without lab)	3-4
STAT:3210	Experimental Design and Analysis	3

Human Factors and Ergonomics

Students in the human factors and ergonomics focus area complete three required courses (10 s.h.), one math or science elective (3 s.h.), one engineering elective (at least 3 s.h.), and two general electives (at least 6 s.h.).

Required Human Factors and Ergonomics Courses

Course #	Title	Hours
All of these:		
PSY:2601	Introduction to Cognitive Psychology	3
PSY:2701	Introduction to Behavioral Neuroscience	4
PSY:2811	Research Methods and Data Analysis in Psychology I	3

Math or Science Elective–Human Factors and Ergonomics

Course #	Title	Hours
One of these:		
ISE:3760/ DATA:3200/ IGPI:3200/ STAT:3200	Applied Linear Regression	3
STAT:3210	Experimental Design and Analysis	3
STAT:4143/ PSQF:4143	Introduction to Statistical Methods	3

Engineering Elective

Course #	Title	Hours
One of these:		
ISE:4175	Safety Engineering	3
ISE:5420	Automated Vehicle Systems	3
ISE:5460	User Experience Design	3
ISE:6220	Cognitive Engineering	3
ISE:6410	Research Methods in Human Factors Engineering	3
ISE:6420	Human/Computer Interaction	3
ISE:6450	Human Factors in Aviation	3
ISE:6480	Unmanned Aircraft Systems	3
BME:2500	Biomaterials and Biomechanics	4
BME:5640	Ergonomics of Occupational Injuries	3

General Electives

Course #	Title	Hours
Two of these:		
PSY:3040	Psychology of Learning	3
PSY:3620	Human Memory	3
PSY:4020	Laboratory in Psychology	4
OEH:4310	Occupational Ergonomics: Principles	3

Management

Students in the management focus area complete five required courses (15 s.h.), one math or science elective (at least 3 s.h.), and one advanced engineering elective (3 s.h.).

Required Management Courses

Course #	Title	Hours
All of these:		
ACCT:2100	Introduction to Financial Accounting	3
ACCT:2200	Managerial Accounting Analytics and Data Visualization	3
MGMT:2000	Introduction to Law	3
MGMT:2100	Introduction to Management	3
MKTG:3000	Introduction to Marketing Strategy	3

Math or Science Elective–Management

Course #	Title	Hours
One of these:		
BIOL:1411	Foundations of Biology	4
CHEM:1120	Principles of Chemistry II	4
MATH:3550	Engineering Vector Calculus	3
MATH:3800/ CS:3700	Introduction to Numerical Methods	3
PHYS:2704	Physics IV (with or without lab)	3-4
STAT:3210	Experimental Design and Analysis	3

Advanced Engineering Elective–Management

Students select one course numbered 3000 or above with at least 3 s.h. from any department in the College of Engineering (prefix BME, CBE, CEE, ECE, ISE, or ME), excluding department seminars.

Tailored

Students work with their advisor to tailor a program that is specific to their individual needs.