

Industrial Engineering, BSIE

Industrial engineering involves the design and analysis of 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.

The program in industrial engineering offers students a base of traditional engineering courses, such as work design, human-machine systems, probability, statistics, and engineering economy, while emphasizing such contemporary areas as simulation modeling, engineering database systems, quality assurance, logistics and supply chain management, operations research, and facilities planning. Students integrate the knowledge acquired in these courses in a two-semester capstone design project.

Industrial engineers work in manufacturing firms, hospitals, banks, public utilities, transportation, government agencies, insurance companies, and construction firms. 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; design of healthcare operations to enhance patient safety; and improve efficiency, productivity, and development of computer systems for information control.

More than 90 percent of department undergraduate students take advantage of the cooperative education program. Cooperative education assignments generally increase in level of responsibility as students gain theoretical and technical knowledge through their academic work. A sophomore might begin as a computer/data analyst evaluating the performance of a manufacturing system and progress to designing manufacturing engineering workstations by the senior year.

Program Requirements

Complete all courses listed below unless otherwise indicated. Also complete any corequisite labs, recitations, clinicals, or tools courses where specified and complete any additional courses needed beyond specific college and major requirements to satisfy graduation credit requirements.

Universitywide Requirements

All undergraduate students are required to complete the Universitywide Requirements (<http://catalog.northeastern.edu/undergraduate/university-academics/university-wide-requirements/>).

NUPath Requirements

All undergraduate students are required to complete the NUPath Requirements (<http://catalog.northeastern.edu/undergraduate/university-academics/nupath/>).

NUPath requirements Interpreting Culture (IC), Societies and Institutions (SI), and Differences and Diversity (DD) are not explicitly satisfied by required engineering courses. Students are responsible for satisfying these requirements with general electives.

Engineering

Code	Title	Hours
Required Engineering		
IE 2310 and IE 2311	Introduction to Industrial Engineering and Recitation for IE 2310	4
IE 3425 and IE 3426	Engineering Database Systems and Recitation for IE 3425	4
IE 4510	Simulation Modeling and Analysis	4
IE 4516	Quality Assurance	4
IE 4522 and IE 4523	Human-Machine Systems and Lab for IE 4522	5
IE 4525	Logistics and Supply Chain Management	4
IE 4530 and IE 4531	Manufacturing Systems and Techniques and Lab for IE 4530	5
Industrial Engineering Capstone		
MEIE 4701	Capstone Design 1	1
MEIE 4702	Capstone Design 2	5
Engineering Electives		
Complete 8 semester hours of technical electives in the following subject areas:		8
BIOE, CHME, CIVE, EECE, EMGT, ENSY, IE, ME, and MEIE		
Supplemental Credit		
1 semester hour from the following course counts toward the engineering requirement:		1

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IE 3412 or MATH 3081	Engineering Probability and Statistics Probability and Statistics	3 semester hours from the following course count toward the engineering requirement:	3
IE 4512	Engineering Economy	2 semester hours from the following course count toward the engineering requirement:	2
IE 4515	Operations Research	2 semester hours from the following course count toward the engineering requirement:	2
IE 4520	Stochastic Modeling	2 semester hours from the following course count toward the engineering requirement:	2
GE 1501	Cornerstone of Engineering 1 ¹	3 semester hours from the following course count toward the engineering requirement:	3
GE 1502	Cornerstone of Engineering 2 ¹		

Supporting Courses: Mathematics/Science

Complete all Mathematics/Science courses with a minimum of 30 semester hours.

Code	Title	Hours
Required Mathematics/Science		
CHEM 1151 and CHEM 1153	General Chemistry for Engineers and Recitation for CHEM 1151	4
MATH 1341	Calculus 1 for Science and Engineering	4
MATH 1342	Calculus 2 for Science and Engineering	4
MATH 2321	Calculus 3 for Science and Engineering	4
MATH 2341	Differential Equations and Linear Algebra for Engineering	4
PHYS 1151 and PHYS 1152 and PHYS 1153	Physics for Engineering 1 and Lab for PHYS 1151 and Interactive Learning Seminar for PHYS 1151	5
Science Elective		
Complete one of the following:		5
BIOL 1111 and BIOL 1112	General Biology 1 and Lab for BIOL 1111	
BIOL 1115 and BIOL 1116	General Biology 1 for Engineers and Lab for BIOL 1115	
BIOL 2217 and BIOL 2218	Integrated Anatomy and Physiology 1 and Lab for BIOL 2217	
CHEM 1214 and CHEM 1215 and CHEM 1216	General Chemistry 2 and Lab for CHEM 1214 and Recitation for CHEM 1214 (and Lab for CHEM 1214)	
CHEM 2311 and CHEM 2312 and CHEM 2319	Organic Chemistry 1 and Lab for CHEM 2311 and Recitation for CHEM 2311	
PHYS 1155 and PHYS 1156 and PHYS 1157	Physics for Engineering 2 and Lab for PHYS 1155 and Interactive Learning Seminar for PHYS 1155	
Supplemental Credit		
3 semester hours from the following course count toward the mathematics/science requirement:		3
IE 3412 or MATH 3081	Engineering Probability and Statistics Probability and Statistics	
1 semester hour from the following course counts toward the mathematics/science requirement:		1
IE 4512	Engineering Economy	
2 semester hours from the following course count toward the mathematics/science requirement:		2
IE 4515	Operations Research	
2 semester hours from the following course count toward the mathematics/science requirement:		2
IE 4520	Stochastic Modeling	
1 semester hour from the following course counts toward the mathematics/science requirement:		1
GE 1501	Cornerstone of Engineering 1 ¹	

Professional Development

Code	Title	Hours
Required Professional Development		
GE 1000	First-Year Seminar	1
ENCP 2000	Introduction to Engineering Co-op Education	1
ENCP 3000	Professional Issues in Engineering	1
Additional Required Courses		
1 semester hour from the following course counts toward the professional development requirement:		1
GE 1501	Cornerstone of Engineering 1 ¹	
1 semester hour from the following course counts toward the professional development requirement:		1
GE 1502	Cornerstone of Engineering 2 ¹	

Writing Requirements

Code	Title	Hours
Writing		
A grade of C or higher is required:		
ENGW 1111	First-Year Writing	4
ENGW 3302 or ENGW 3315	Advanced Writing in the Technical Professions Interdisciplinary Advanced Writing in the Disciplines	4

Required General Electives

Code	Title	Hours
Complete 28 SH of academic, nonremedial, nonrepetitive courses.		28

Program Requirement

137 total semester hours required

¹ Students can substitute GE 1110 and GE 1111 for GE 1501 and 1502 in approved situations.

Plan of Study**Four Years, Two Co-ops in Summer 2/Fall**

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 (ND)		4 GE 1502 (ER)		4 MATH 2321 (FQ)		4 General Elective	4
CHEM 1153		0 MATH 1342 (FQ)		4 General Elective		4 General Elective	4
ENGW 1111 (WF)		4 PHYS 1151 (ND)		3			
GE 1000		1 PHYS 1152 (AD)		1			
GE 1501		4 PHYS 1153		1			
MATH 1341 (FQ)		4 General Elective		4			
		17			17	8	8
Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
IE 2310 (WI)		4 ENCP 2000		1 General Elective		4 Co-op	
IE 2311		0 ENGW 3302 or 3315 (WD)		4 General Elective		4	
IE 3425		4 IE 3412 or MATH 3081 (AD)		4			
IE 3426		0 IE 4512		4			
MATH 2341		4 Technical Elective		4			
Science Elective		5					
		17			17	8	0
Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		IE 4510		4 MEIE 4701 (EI, WI, CE)		1 Co-op	
		IE 4515		4 General Elective		4	
		IE 4516		4 Technical Elective		4	

	IE 4530	4			
	IE 4531	1			
	0	17		9	0
Year 4					
Fall	Hours	Spring	Hours		
Co-op		ENCP 3000	1		
		IE 4520	4		
		IE 4522	4		
		IE 4523	1		
		IE 4525	4		
		MEIE 4702 (EI, WI, CE)	5		
	0	19			

Total Hours: 137

Four Years, Two Co-ops in Spring/Summer 1**Year 1**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 (ND)	4	GE 1502 (ER)	4	MATH 2321 (FQ)	4	General Elective	4
CHEM 1153	0	MATH 1342 (FQ)	4	General Elective	4	General Elective	4
ENGW 1111 (WF)	4	PHYS 1151 (ND)	3				
GE 1000	1	PHYS 1152 (AD)	1				
GE 1501	4	PHYS 1153	1				
MATH 1341 (FQ)	4	General Elective	4				
	17		17		8		8

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ENCP 2000	1	Co-op		Co-op		MATH 3081 (AD)	4
IE 2310 (WI)	4					General Elective	4
IE 2311	0						
IE 3425	4						
IE 3426	0						
MATH 2341	4						
Science Elective	5						
	18		0		0		8

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ENGW 3302 or 3315 (WD)	4	Co-op		Co-op		General Elective	4
IE 4510	4					General Elective	4
IE 4515	4						
IE 4530	4						
IE 4531	1						
	17		0		0		8

Year 4

Fall	Hours	Spring	Hours
ENCP 3000	1	IE 4520	4
IE 4512	4	IE 4522	4
IE 4516	4	IE 4523	1
IE 4525	4	MEIE 4702 (EI, WI, CE)	5
MEIE 4701 (EI, WI, CE)	1	Technical Elective	4

Technical Elective	4		
	18	18	

Total Hours: 137

Five Years, Three Co-ops in Summer 2/Fall

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 (ND)		4 GE 1502 (ER)		4 Vacation		0 Vacation	0
CHEM 1153	0	MATH 1342 (FQ)		4			
ENGW 1111 (WF)	4	PHYS 1151 (ND)		3			
GE 1000	1	PHYS 1152 (AD)		1			
GE 1501	4	PHYS 1153		1			
MATH 1341 (FQ)	4	General Elective		4			
	17		17		0		0
Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
IE 2310 (WI)		4 ENCP 2000		1 Vacation		0 Co-op	0
IE 2311	0	IE 3412 or MATH 3081 (AD)		4			
IE 3425	4	IE 4512		4			
IE 3426	0	MATH 2341		4			
MATH 2321 (FQ)	4	General Elective		4			
Science Elective	5						
	17		17		0		0
Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	ENGW 3302 or 3315 (WD)		4 General Elective		4 Co-op	0
		IE 4510		4 General Elective		4	
		IE 4515		4			
		IE 4516		4			
	0		16		8		0
Year 4							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	ENCP 3000		1 MEIE 4701 (EI, CE, WI)		1 Co-op	0
		IE 4520		4 General Elective		4	
		IE 4525		4 General Elective		4	
		IE 4530		4			
		IE 4531		1			
		Technical Elective		4			
	0		18		9		0
Year 5							
Fall	Hours	Spring	Hours				
Co-op	0	IE 4522		4			
		IE 4523		1			
		MEIE 4702 (EI, WI, CE)		5			
		General Elective		4			
		Technical Elective		4			
	0		18				

Total Hours: 137

Five Years, Three Co-ops in Spring/Summer 1

Year 1								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
CHEM 1151 (ND)		4 GE 1502 (ER)		4 Vacation		0 Vacation		0
CHEM 1153	0	MATH 1342 (FQ)		4				
ENGW 1111 (WF)	4	PHYS 1151 (ND)		3				
GE 1000	1	PHYS 1152 (AD)		1				
GE 1501	4	PHYS 1153		1				
MATH 1341 (FQ)	4	General Elective		4				
	17			17		0		0
Year 2								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
ENCP 2000		1 Co-op		0 Co-op		0 Vacation		0
IE 2310 (WI)	4							
IE 2311	0							
IE 3425	4							
IE 3426	0							
MATH 2321 (FQ)	4							
Science Elective	5							
	18			0		0		0
Year 3								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
ENGW 3302 or 3315 (WD)		4 Co-op		0 Co-op		0 General Elective		4
IE 3412 or MATH 3081 (AD)	4					General Elective		4
IE 4512	4							
MATH 2341	4							
	16			0		0		8
Year 4								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
ENCP 3000		1 Co-op		0 Co-op		0 General Elective		4
IE 4510	4					General Elective		4
IE 4515	4							
IE 4516	4							
IE 4530	4							
IE 4531	1							
	18			0		0		8
Year 5								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
IE 4520		4 IE 4522		4				
IE 4525	4	IE 4523		1				
MEIE 4701 (EI, WI, CE)	1	MEIE 4702 (EI, WI, CE)		5				
General Elective	4	General Elective		4				
Technical Elective	4	Technical Elective		4				
	17			18				

Total Hours: 137