

# Chemical Engineering, BSChE

The chemical engineering program offers students a broad education built on fundamentals in science, mathematics, and engineering, which are then applied to contemporary problems using modern tools, such as computational software and computer-aided design. Chemical engineers have traditionally been employed in chemical, petrochemical, agricultural chemical, pulp and paper, plastics, cosmetics, and textiles industries and in consulting and design firms. Today, chemical engineers also play an integral role in bioprocesses and biomedicine, Big Data and artificial intelligence, sustainability and energy, and study of advanced materials, including nanotechnology. For example, chemical engineers are creating new materials needed for space exploration, alternative energy sources, and faster, self-powered computer chips. In biotechnology and biomedicine, chemical engineers are working to understand human diseases, developing new therapies and drug delivery systems, and producing new medicines through cell culture techniques. Chemical engineers employ nanotechnology to revolutionize sensors, security systems, and medical diagnostics and treatments. In addition to creating important products, chemical engineers are also involved in protecting our environment by exploring ways to reduce acid rain and smog; to recycle and reduce wastes; to develop new sources of environmentally clean energy; and to design inherently safe, efficient, and “green” processes. The role of a chemical engineer is to develop new products and to design processes while reducing costs, increasing production, and improving the quality and safety of new products.

The degree also serves as a springboard to advanced study in chemical engineering or postgraduate pathways including law school, business school, or medical/health professions school.

## 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
CHME 2308	Conservation Principles in Chemical Engineering	4
CHME 2310	Transport Processes 1	4
CHME 2320	Chemical Engineering Thermodynamics 1	4
CHME 3312	Transport Processes 2	4
CHME 3315 and CHME 3316	Chemical Engineering Experimental Design 1 and Recitation for CHME 3315 (Chem Eng Lab 1)	4
CHME 3322	Chemical Engineering Thermodynamics 2	4
CHME 4315 and CHME 4316	Chemical Engineering Experimental Design 2 and Recitation for CHME 4315 (Chem Eng Lab 2)	4
CHME 4510	Chemical Engineering Kinetics	4
CHME 4512	Chemical Engineering Process Control	4
<b>Chemical Engineering Capstone</b>		
CHME 4701	Separations and Process Analysis	4
CHME 4703 and CHME 4705	Chemical Process Design Capstone and Recitation for CHME 4703	4
<b>Advanced Engineering Elective</b>		
Complete one course numbered between 4000 and 5999 in any of the following subject areas: BIOE, CHME, CIVE, EECE, ME, IE, MEIE, and ENGR		4
<b>Supplemental Credit</b>		
2 semester hours from the following course count toward the engineering requirement:		2
GE 1501	Cornerstone of Engineering 1 <sup>1</sup>	

3 semester hours from the following course count toward the engineering requirement:

3

GE 1502	Cornerstone of Engineering 2 <sup>1</sup>
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### Supporting Courses: Mathematics/Science

Complete all mathematics/science courses with a minimum of 30 semester hours.

Code	Title	Hours
<b>Required Mathematics/Science</b>		
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
Complete one of the following:		4-5
BIOL 1111	General Biology 1	
BIOL 1115	General Biology 1 for Engineers	
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

1 semester hour from the following course counts toward the mathematics/science requirement:

1

GE 1501	Cornerstone of Engineering 1 <sup>1</sup>
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### Supporting Courses: Advanced Science

Code	Title	Hours
Complete one of the following pairs:		5
CHEM 2311 and CHEM 2312	Organic Chemistry 1 and Lab for CHEM 2311	
CHEM 2315 and CHEM 2316	Organic Chemistry 1 for Chemistry Majors and Lab for CHEM 2315	
Complete one of the following pairs:		5
CHEM 2313 and CHEM 2314	Organic Chemistry 2 and Lab for CHEM 2313	
CHEM 2317 and CHEM 2318	Organic Chemistry 2 for Chemistry Majors and Lab for CHEM 2317	
Complete one of the following:		4-6
BIOL 2301	Genetics and Molecular Biology	
BIOL 2327	Human Parasitology	
BIOL 3421 and BIOL 3422	Microbiology and Lab for BIOL 3421	
BIOL 3603	Mammalian Systems Physiology	
BIOL 3611 and BIOL 3612	Biochemistry and Lab for BIOL 3611	
CHEM 2321 and CHEM 2322	Analytical Chemistry and Lab for CHEM 2321	
CHEM 3403 and CHEM 3404	Quantum Chemistry and Spectroscopy and Lab for CHEM 3403	
CHEM 3431 and CHEM 3432	Physical Chemistry and Lab for CHEM 3431	
CHEM 3501 and CHEM 3502 and CHEM 3503	Inorganic Chemistry and Lab for CHEM 3501 and Recitation for CHEM 3501	

CHEM 4628 and CHEM 4629	Introduction to Spectroscopy of Organic Compounds and Identification of Organic Compounds
EEMB 2302 and EEMB 2303	Ecology and Lab for EEMB 2302
EEMB 3460	Conservation Biology
PHYS 1211	Computational Problem Solving in Physics
PHYS 2303	Modern Physics
PHYS 2371 and PHYS 2372	Electronics and Lab for PHYS 2371
PHYS 3601	Classical Dynamics
PHYS 3602	Electricity and Magnetism 1

## Professional Development

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

## Writing Requirements

Code	Title	Hours
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 24 semester hours of academic, nonremedial, nonrepetitive courses.		24

## Major GPA Requirement

2.000 minimum GPA required in CHME courses

## Program Requirement

134 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 CHME 2308		4 CHME 2320	4
CHEM 1153		0 MATH 1342 (FQ)		4 MATH 2321 (FQ)		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

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**Year 2**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 2311 or 2315		4 BIOL 1115 or PHYS 1155 <i>and</i> PHYS 1156 <i>and</i> PHYS 1157 (ND)		4 Advanced science elective		4 Co-op	0
CHEM 2312 or 2316		1 CHEM 2313 or 2317		4 General elective		4	
CHME 2310		4 CHEM 2314 or 2318		1			
MATH 2341		4 CHME 3312		4			
General elective		4 CHME 3322		4			
		ENCP 2000		1			
	17		18			8	0

**Year 3**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		0 CHME 3315 (AD)		4 General elective		4 Co-op	0
		CHME 3316		0 General elective		4	
		ENGW 3302 or 3315 (WD)		4			
		CHME 4510		4			
		CHME 4701		4			
	0		16			8	0

**Year 4**

Fall	Hours	Spring	Hours
Co-op		0 CHME 4315 (AD, WI)	4
		CHME 4316	0
		CHME 4512	4
		CHME 4703 (EI, CE, WI)	4
		CHME 4705	0
		ENCP 3000	1
		Advanced engineering elective	4
	0		17

Total Hours: 134

**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 CHME 2308		4 CHME 2320	4
CHEM 1153		0 MATH 1342 (FQ)		4 MATH 2321 (FQ)		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
BIOL 1115 or PHYS 1155 <i>and</i> PHYS 1156 <i>and</i> PHYS 1157 (ND)		4 Co-op		0 Co-op		0 CHEM 2313	4
CHEM 2311 or 2315		4				CHEM 2314	1
CHEM 2312 or 2316		1				General elective	4
CHME 2310		4					
MATH 2341		4					
	17		0			0	9

Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHME 3312		4 Co-op		0 Co-op		0 General elective	4
CHME 3315 (AD)	4					General elective	4
CHME 3316	0						
CHME 3322	4						
ENGW 3302 or 3315 (WD)	4						
ENCP 2000	1						
		17			0	0	8

Year 4							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHME 4315 (AD, WI)		4 CHME 4512		4			
CHME 4316	0	CHME 4703 (EI, CE, WI)		4			
CHME 4510	4	CHME 4705		0			
CHME 4701	4	Advanced engineering elective		4			
ENCP 3000	1	Advanced science elective		4			
General elective	4						
		17			16		

Total Hours: 134

### 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
BIOL 1115 or PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)		4 CHEM 2313 or 2317		4 Vacation		0 Co-op	0
CHEM 2311 or 2315	4	CHEM 2314 or 2318		1			
CHEM 2312 or 2316	1	CHME 2310		4			
CHME 2308	4	CHME 2320		4			
MATH 2321 (FQ)	4	ENCP 2000		1			
		MATH 2341		4			
		17			18	0	0

Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		0 CHME 3312		4 General elective		4 Co-op	0
		CHME 3315 (AD)		4 General elective		4	
		CHME 3316		0			
		CHME 3322		4			
		ENGW 3302 or 3315 (WD)		4			
		0			16	8	0

**Year 4**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		0 CHME 4315 (AD, WI)		4 General elective		4 Co-op	0
		CHME 4316		0 General elective		4	
		CHME 4510		4			
		CHME 4701		4			
		ENCP 3000		1			
		General elective		4			
	0		17		8		0

**Year 5**

Fall	Hours	Spring	Hours
Co-op		0 CHME 4512	4
		CHME 4703 (EI, CE, WI)	4
		CHME 4705	0
		Advanced engineering elective	4
		Advance science elective	4
	0		16

Total Hours: 134

**Five Years, Three 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 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
BIOL 1115 or PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)		4 Co-op		0 Co-op		0 CHEM 2313 or 2317	4
CHEM 2311 or 2315		4				CHEM 2314 or 2318	1
CHEM 2312 or 2316		1				CHME 2320	4
CHME 2308		4					
ENCP 2000		1					
MATH 2321 (FQ)		4					
	18		0		0		9

**Year 3**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHME 2310		4 Co-op		0 Co-op		0 General elective	4
CHME 3322		4				General elective	4
MATH 2341		4					
General elective		4					
	16		0		0		8

**Year 4**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHME 3312		4 Co-op		0 Co-op		0 Vacation	0
CHME 3315 (AD)		4					

CHME 3316	0			
ENCP 3000	1			
ENGW 3302 or 3315 (WD)	4			
General elective	4			
	17	0	0	0

**Year 5**

Fall	Hours	Spring	Hours
CHME 4315 (AD, WI)	4	CHME 4512	4
CHME 4316	0	CHME 4703 (EI, CE, WI)	4
CHME 4510	4	CHME 4705	0
CHME 4701	4	Advanced engineering elective	4
Advanced science elective	4	General elective	4
	16		16

Total Hours: 134