

Chemical Engineering and Bioengineering, BSChE

The Bachelor of Science in Chemical Engineering and Bioengineering provides students with a broad education built on fundamentals in science, mathematics, and engineering, with the breadth of knowledge and problem solving established in chemical engineering applied through a bioengineering focus. Chemical engineering and bioengineering have long been closely related, working to understand human diseases, developing new therapies and drug delivery systems, and producing new medicines through cell culture techniques. This specific combined major allows for chemical engineering expertise in advanced materials and chemical processes, with the additional specialized bioengineering mastery of the biological constraints intrinsic to supporting and designing systems to aid and repair living systems.

Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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 (<https://catalog.northeastern.edu/undergraduate/university-academics/university-wide-requirements/>).

NUpath Requirements

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

NUpath requirements: Interpreting Culture (IC), Understanding Societies and Institutions (SI), Engaging Differences and Diversity (DD), and Integrating Knowledge and Skills Through Experience (EX) are not explicitly satisfied by required engineering coursework. Successful completion of a cooperative education experience fulfills the EX requirement. Students are responsible for satisfying unfulfilled NUpath requirements with general elective coursework.

Chemical Engineering Requirements

Code	Title	Hours
Required Engineering		
CHME 2308	Conservation Principles in Chemical Engineering	4
CHME 2310	Transport Processes 1	4
CHME 2320	Chemical Engineering Thermodynamics	4
CHME 3305 and CHME 3306	Chemical Engineering Laboratory and Recitation for CHME 3305	4
CHME 3312	Transport Processes 2	4
CHME 3322	Chemical Thermodynamics	4
CHME 4510	Chemical Engineering Kinetics	4
CHME 4512	Chemical Engineering Process Control	4
CHME 4701	Separations and Process Analysis	4
Supplemental Credit		
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	

Bioengineering Requirements

Code	Title	Hours
Core Bioengineering Courses		
BIOE 2355	Quantitative Physiology for Bioengineers	4

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BIOE 3210	Bioelectricity	4
Cell and Tissue Engineering Courses		
BIOE 5410	Molecular Bioengineering	4
BIOE 5420	Cellular Engineering	4
BIOE 5430	Principles and Applications of Tissue Engineering	4
Bioengineering Capstone		
BIOE 4790	Capstone Design 1	4
BIOE 4792	Capstone Design 2	4

Supporting Courses: Mathematics/Science

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

Code	Title	Hours
Required Mathematics/Science		
BIOL 1111	General Biology 1	4
CHEM 1151 and CHEM 1153	General Chemistry for Engineers and Recitation for CHEM 1151	4
CHEM 2311 and CHEM 2312	Organic Chemistry 1 and Lab for CHEM 2311	5
CHEM 2313 and CHEM 2314	Organic Chemistry 2 and Lab for CHEM 2313	5
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
PHYS 1155 and PHYS 1156 and PHYS 1157	Physics for Engineering 2 and Lab for PHYS 1155 and Interactive Learning Seminar for PHYS 1155	5
Supplemental Credit		
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
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
A grade of C or higher is required:		
ENGW 1111	First-Year Writing	4
ENGW 3302 or ENGW 3307 or ENGW 3315	Advanced Writing in the Technical Professions Advanced Writing in the Sciences Interdisciplinary Advanced Writing in the Disciplines	4

Required General Electives

Code	Title	Hours
Complete 8 semester hours of academic, nonremedial, nonrepetitive courses.		8

Integrative Courses

Code	Title	Hours
These courses are already required above and also fulfill the integrative requirement.		
CHME 4315	Chemical Engineering Experimental Design 2	4
CHME 4510	Chemical Engineering Kinetics	4

Major GPA Requirement

2.000 minimum GPA required in CHME coursework

2.000 minimum GPA required in all BIOE coursework

Program Requirement

135 total semester hours required

¹ Students can substitute Engineering Design (GE 1110) and Engineering Problem Solving and Computation (GE 1111) for Cornerstone of Engineering 1 (GE 1501) and Cornerstone of Engineering 2 (GE 1502) .

Plan of Study**Sample Plan of Study****FOUR YEARS, ONE CO-OP IN SUMMER 2/FALL**

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153 (ND)		4 BIOL 1111 (ND)		4 MATH 2321 (FQ)		4 Vacation	
ENGW 1111 (WF)		4 GE 1502 (ER)		4 PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)		5	
GE 1000		1 MATH 1342 (FQ)		4			
GE 1501		4 PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)		5			
MATH 1341 (FQ)		4					
		17		17		9	0
Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOE 2355		4 CHEM 2313 and CHEM 2314		5 Vacation		Vacation	
CHEM 2311 and CHEM 2312 (AD, WI)		5 CHME 2310		4			
CHME 2308		4 CHME 2320		4			
MATH 2341		4 General elective		4			
		17		17		0	0
Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOE 3210		4 BIOE 5410		4 BIOE 4790 (EI, CE, WI)		4 Co-op	0
CHME 3312		4 BIOE 5420		4 General elective		4	
CHME 3322		4 CHME 3305 and CHME 3306		4			
ENGW 3302, 3307, or 3315 (WD)		4 CHME 4510		4			
		ENCP 2000		1			
		16		17		8	0

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Year 4

Fall	Hours	Spring	Hours
Co-op		0 BIOE 4792 (EI, CE, WI)	4
		BIOE 5430	4
		CHME 4512	4
		CHME 4701	4
		ENCP 3000	1
	0		17

Total Hours: 135

FOUR YEARS, ONE CO-OP IN SPRING/SUMMER 1

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153 (ND)		4 BIOL 1111 (ND)		4 MATH 2321 (FQ)		4 Vacation	
ENGW 1111 (WF)		4 GE 1502 (ER)		4 PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)		5	
GE 1000		1 MATH 1342 (FQ)		4			
GE 1501		4 PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)		5			
MATH 1341 (FQ)		4					
	17		17		9		0

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOE 2355		4 CHEM 2313 and CHEM 2314		5 Vacation		Vacation	
CHEM 2311 and CHEM 2312 (AD, WI)		5 CHME 2310		4			
CHME 2308		4 CHME 2320		4			
MATH 2341		4 General elective		4			
	17		17		0		0

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHME 3312		4 Co-op		0 Co-op		0 BIOE 3210	4
CHME 3322		4				BIOE 4790	4
CHME 3305 and CHME 3306		4					
ENGW 3302, 3307, or 3315 (WD)		4					
ENCP 2000		1					
	17		0		0		8

Year 4

Fall	Hours	Spring	Hours
CHME 4510		4 BIOE 5420	4
CHME 4701		4 BIOE 5430	4
BIOE 5410		4 CHME 4512	4
BIOE 4792		4 General elective	4
		ENCP 3000	1
	16		17

Total Hours: 135

FIVE YEARS, THREE CO-OPS IN SUMMER 2/FALL

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153 (ND)		4 BIOL 1111 (ND)		4 MATH 2321 (FQ)		4 Vacation	
ENGW 1111 (WF)		4 GE 1502 (ER)		4 PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)		5	
GE 1000		1 MATH 1342 (FQ)		4			
GE 1501		4 PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)		5			
MATH 1341 (FQ)		4					
		17		17		9	0
Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOE 2355		4 CHME 2310		4 Vacation		Co-op	0
CHEM 2311 and CHEM 2312 (AD, WI)		5 CHEM 2313 and CHEM 2314		5			
CHME 2308		4 CHME 2320		4			
MATH 2341		4 ENCP 2000		1			
		General elective		4			
		17		18		0	0
Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		0 BIOE 3210		4 Vacation		Co-op	0
		CHME 3312		4			
		CHME 3322		4			
		ENGW 3302, 3307, or 3315 (WD)		4			
		0		16		0	0
Year 4							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		0 BIOE 5410		4 BIOE 4790 (EI, CE, WI)		4 Co-op	0
		BIOE 5420		4 General elective		4	
		CHME 3305 and CHME 3306		4			
		CHME 4510		4			
		ENCP 3000		1			
		0		17		8	0
Year 5							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		0 BIOE 4792 (EI, CE, WI)		4			
		BIOE 5430		4			
		CHME 4512		4			
		CHME 4701		4			
		0		16			

Total Hours: 135

FIVE YEARS, THREE CO-OPS IN SPRING/SUMMER 1

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153 (ND)		4 BIOL 1111 (ND)		4 MATH 2321 (FQ)		4 Vacation	

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ENGW 1111 (WF)	4	GE 1502 (ER)	4	PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)	5			
GE 1000	1	MATH 1342 (FQ)	4					
GE 1501	4	PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)	5					
MATH 1341 (FQ)	4							
	17		17		9			0
Year 2								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
BIOE 2355	4	Co-op	0	Co-op	0	Vacation		
CHEM 2311 and CHEM 2312 (AD, WI)	5							
CHME 2308	4							
MATH 2341	4							
ENCP 2000	1							
	18		0		0			0
Year 3								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
CHME 2310	4	Co-op	0	Co-op	0	Vacation		
CHEM 2313 and CHEM 2314	5							
CHME 2320	4							
General elective	4							
	17		0		0			0
Year 4								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
CHME 3312	4	Co-op	0	Co-op	0	BIOE 3210		4
CHME 3322	4					BIOE 4790		4
CHME 3305 and CHME 3306	4							
ENGW 3302, 3307, or 3315	4							
	16		0		0			8
Year 5								
Fall	Hours	Spring	Hours					
CHME 4510	4	BIOE 5430	4					
CHME 4701	4	BIOE 5420	4					
BIOE 4792	4	CHME 4512	4					
BIOE 5410	4	ENCP 3000	1					
		General elective	4					
	16		17					

Total Hours: 135