

# Chemical Engineering and Biochemistry, BSChE

This intercollege combined major serves students who would like to explore their interest in biochemistry while earning the benefit of a Bachelor of Science degree in chemical engineering. The program combines the fundamentals of biochemistry with the engineering skills necessary for scale-up of biochemical processes. The curriculum is designed to prepare students well to enter the growing biotechnology industry and be able to converse from the chemistry of organisms to the design of vessels for successful synthesis of cells and pharmaceuticals.

Visit the department website (<https://che.northeastern.edu/academics/undergraduate-studies/che-accreditation/>) for program educational objectives.

## 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.

## Engineering Requirements

Code	Title	Hours
<b>Required Engineering</b>		
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
<b>Chemical Engineering Elective</b>		
Complete one CHME course in the 2000-5999 range.		4
<b>Chemical Engineering Capstone</b>		
CHME 4703 and CHME 4705	Chemical Process Design Capstone and Recitation for CHME 4703	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>

### Mathematics/Science Requirement

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

Code	Title	Hours
<b>Required Mathematics/Science</b>		
BIOL 2301 and BIOL 2302	Genetics and Molecular Biology and Lab for BIOL 2301	5
BIOL 3611 and BIOL 3612	Biochemistry and Lab for BIOL 3611	5
BIOL 4707	Cell and Molecular Biology	4
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
<b>Advanced Biology Elective</b>		
Complete one course in the following range (the course must be lecture-based, or lecture with corequisite lab, and not an independent research course):		3-5
BIOL 2311 to BIOL 5999		
<b>Supplemental Credit</b>		
1 semester hour from the following course counts toward the mathematics/science requirement:		1
GE 1501 Cornerstone of Engineering 1 <sup>1</sup>		

### Advanced Science Requirement

Code	Title	Hours
BIOL 1111	General Biology 1	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
CHEM 2321 and CHEM 2322 and CHEM 2323 or CHEM 3331 and CHEM 3332	Analytical Chemistry and Lab for CHEM 2321 and Recitation for CHEM 2321 Bioanalytical Chemistry and Lab for CHEM 3331	5

#### Advanced Chemistry Elective

Complete one course in the following range (the course must be lecture-based, or lecture with corequisite lab, and not an independent research course): 3-5

CHEM 2310 to CHEM 5999

### 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
<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>
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## Writing Requirements

Code	Title	Hours
A grade of C or higher is required:		
ENGW 1111	First-Year Writing	4
ENGW 3302	Advanced Writing in the Technical Professions	4
or ENGW 3307	Advanced Writing in the Sciences	
or ENGW 3315	Interdisciplinary Advanced Writing in the Disciplines	

## Required General Electives

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

<sup>1</sup> 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) .

## Major GPA Requirement

2.000 minimum required in CHME coursework

## Program Requirement

135 total semester hours required

## Plan of Study

### Sample Plans of Study

#### FOUR YEARS, ONE CO-OP IN SUMMER 2/FALL

Year 1								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
CHEM 1151 and CHEM 1153 (ND)		4 CHME 2308		4 Vacation		Vacation		
ENGW 1111 (WF)	4	GE 1502 (ER)		4				
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		0			0
Year 2								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
BIOL 1111 (ND)		4 CHEM 2313 and CHEM 2314		5 Vacation		BIOL 2301 and BIOL 2302		5
CHEM 2311 and CHEM 2312	5	CHEM 2321 and CHEM 2322 and CHEM 2323 (AD, WI)		5		CHME 2320		4
MATH 2321 (FQ)	4	CHME 2310		4				
General Elective	4	MATH 2341		4				
	17		18		0			9
Year 3								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Hours
CHME 3312		4 CHME 4510		4 BIOL 3611 and BIOL 3612		5 Co-op		0
CHME 3322	4	CHME 4701		4 General elective		4		
CHME 3305 and CHME 3306	4	Chemical Engineering Elective		4				
ENGW 3302, 3307, or 3315 (WD)	4	Advanced CHEM elective		3				

		ENCP 2000		1				
	<b>16</b>			<b>16</b>		<b>9</b>		<b>0</b>
<b>Year 4</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>		<b>Hours</b>				
Co-op	0	BIOL 4707		4				
		CHME 4512		4				
		CHME 4703 and CHME 4705 (EI, CE, WI)		4				
		ENCP 3000		1				
		Advanced BIOL elective		3				
	<b>0</b>			<b>16</b>				

Total Hours: 135

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

<b>Year 1</b>									
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>		<b>Hours</b>	<b>Summer 1</b>		<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>
CHEM 1151 and CHEM 1153 (ND)	4	CHME 2308		4	Vacation			Vacation	
ENGW 1111 (WF)	4	GE 1502 (ER)		4					
GE 1000	1	MATH 1342 (FQ)		4					
GE 1501	4	PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)		5					
MATH 1341 (FQ)	4								
	<b>17</b>			<b>17</b>			<b>0</b>		<b>0</b>
<b>Year 2</b>									
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>		<b>Hours</b>	<b>Summer 1</b>		<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>
BIOL 1111 (ND)	4	CHEM 2313 and CHEM 2314		5	Vacation			BIOL 2301 and BIOL 2302	5
CHEM 2311 and CHEM 2312	5	CHEM 2321 and CHEM 2322 (AD, WI)		5				CHME 2320	4
MATH 2321 (FQ)	4	CHEM 2323		0					
General Elective	4	CHME 2310		4					
		MATH 2341		4					
	<b>17</b>			<b>18</b>			<b>0</b>		<b>9</b>
<b>Year 3</b>									
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>		<b>Hours</b>	<b>Summer 1</b>		<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>
CHME 3312	4	Co-op		0	Co-op			0 BIOL 3611 and BIOL 3612	5
CHME 3322	4							General elective	4
CHME 3305 and CHME 3306	4								
ENGW 3302, 3307, or 3315 (WD)	4								
ENCP 2000	1								
	<b>17</b>			<b>0</b>			<b>0</b>		<b>9</b>
<b>Year 4</b>									
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>		<b>Hours</b>					
CHME 4510	4	BIOL 4707		4					
CHME 4701	4	CHME 4512		4					
Chemical Engineering elective	4	CHME 4703 and CHME 4705 (EI, CE, WI)		4					
Advanced CHEM elective	3	ENCP 3000		1					

Advanced BIOL elective 3

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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 CHME 2308		4 MATH 2321		4 Vacation	
ENGW 1111 (WF)		4 GE 1502 (ER)		4 General Elective		4	
GE 1000		1 MATH 1342 (FQ)		4			
GE 1501		4 PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)		5			
MATH 1341 (FQ)		4					
		<b>17</b>		<b>17</b>		<b>8</b>	<b>0</b>
Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOL 1111		4 BIOL 2301 and BIOL 2302		5 Vacation		Co-op	0
CHEM 2311 and CHEM 2312		5 CHEM 2313 and CHEM 2314		5			
CHME 2320		4 CHEM 2321 and CHEM 2322 and CHEM 2323 (AD, WI)		5			
MATH 2341		4 CHME 2310		4			
ENCP 2000		1					
		<b>18</b>		<b>19</b>		<b>0</b>	<b>0</b>
Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		0 CHME 3305 and CHME 3306		4 BIOL 3611 and BIOL 3612		5 Co-op	0
		CHME 3312		4 Advanced CHEM elective		3	
		CHME 3322		4			
		ENGW 3302, 3307, or 3315 (WD)		4			
		<b>0</b>		<b>16</b>		<b>8</b>	<b>0</b>
Year 4							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		0 BIOL 4707		4 Vacation		Co-op	0
		CHME 4510		4			
		CHME 4701		4			
		ENCP 3000		1			
		Advanced BIOL elective		3			
		<b>0</b>		<b>16</b>		<b>0</b>	<b>0</b>
Year 5							
Fall	Hours	Spring	Hours				
Co-op		0 CHME 4512		4			
		CHME 4703 and CHME 4705 (EI, WI, CE)		4			
		Chemical Engineering Elective		4			

General Elective	4
<b>0</b>	<b>16</b>

Total Hours: 135

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

<b>Year 1</b>							
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>
CHEM 1151 and CHEM 1153 (ND)	4	CHME 2308	4	MATH 2321	4	Vacation	4
ENGW 1111 (WF)	4	GE 1502 (ER)	4	General Elective	4		
GE 1000	1	MATH 1342 (FQ)	4				
GE 1501	4	PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)	5				
MATH 1341 (FQ)	4						
	<b>17</b>		<b>17</b>			<b>8</b>	<b>0</b>
<b>Year 2</b>							
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>
BIOL 1111	4	Co-op	0	Co-op	0	Vacation	0
CHEM 2311 and CHEM 2312	5						
CHME 2320	4						
MATH 2341	4						
ENCP 2000	1						
	<b>18</b>		<b>0</b>		<b>0</b>		<b>0</b>
<b>Year 3</b>							
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>
CHEM 2313 and CHEM 2314	5	Co-op	0	Co-op	0	BIOL 3611 and BIOL 3612	5
CHEM 2321 and CHEM 2322 and CHEM 2323	5					Advanced CHEM elective	3
CHME 2310	4						
BIOL 2301	4						
BIOL 2302	1						
	<b>19</b>		<b>0</b>		<b>0</b>		<b>8</b>
<b>Year 4</b>							
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>
CHME 3305 and CHME 3306	4	Co-op	0	Co-op	0	Vacation	0
CHME 3312	4						
CHME 3322	4						
ENGW 3302, 3307, or 3315	4						
	<b>16</b>		<b>0</b>		<b>0</b>		<b>0</b>
<b>Year 5</b>							
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>				
BIOL 4707	4	CHME 4512	4				
CHME 4510	4	CHME 4703 and CHME 4705 (EI, WI, CE)	4				
CHME 4701	4	Chemical Engineering Elective	4				
ENCP 3000	1	General Elective	4				

Advanced BIOL elective	3
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**Total Hours: 135**