

Chemical Engineering and Data Science, BSChE (Boston)

Overview

The Bachelor of Science in Chemical Engineering and Data Science provides students with the technical and analytical skills to work with large datasets. The curriculum focuses on the application of data science methods to solve problems in the chemical engineering field, including the development of predictive models, optimization of processes, and the design of experiments. Students also have an opportunity to learn data visualization, machine learning, and artificial intelligence techniques.

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 (<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/>).

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 may fulfill the EX requirement. Students are responsible for satisfying unfulfilled NUPath requirements with general elective coursework.

Engineering Requirements

Code	Title	Hours
Required Engineering		
CHME 2308	Conservation Principles in Chemical Engineering	4
CHME 2310	Transport Processes 1	4
CHME 2320	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
Chemical Engineering Capstone		
CHME 4703 and CHME 4705	Chemical Process Design Capstone and Recitation for CHME 4703	4
Supplemental Credit		
2 semester hours from the following count toward the engineering requirement:		2
GE 1501	Cornerstone of Engineering 1 ¹	
3 semester hours from the following count toward the engineering requirement:		3
GE 1502	Cornerstone of Engineering 2 ¹	

Data Science Courses

Code	Title	Hours
Computer Science Required Courses		
All students can take a self-assessment to attempt to place out of CS 2000 and CS 2001. Students who place out of CS 2000 and CS 2001 will instead substitute 4-5 semester hours of CS, CY, or DS coursework at the 3000 level or higher not otherwise required in the degree.		

CS 1800 and CS 1802	Discrete Structures and Seminar for CS 1800	5
CS 2000 and CS 2001	Introduction to Program Design and Implementation and Lab for CS 2000	5
CS 3200	Introduction to Databases	4

Programming Sequence Pathways

Complete one of the following two options: 9-10

Computer Science Option

CS 2100 and CS 2101	Program Design and Implementation 1 and Lab for CS 2100	
CS 3100 and CS 3101	Program Design and Implementation 2 and Lab for CS 3100	

Data Science Option

DS 2500 and DS 2501	Intermediate Programming with Data and Lab for DS 2500	
DS 3500	Advanced Programming with Data	

Data Science Foundations

DS 3000	Foundations of Data Science	4
DS 4200	Information Presentation and Visualization	4
DS 4300	Large-Scale Information Storage and Retrieval	4
DS 4400	Machine Learning and Data Mining 1	4

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
MATH 3081 and MATH 3082	Probability and Statistics and Recitation for MATH 3081	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

Supplemental Credit

1 semester hour from the following counts toward the mathematics/science requirement:		1
GE 1501	Cornerstone of Engineering 1 ¹	

Professional Development

Code	Title	Hours
ENCP 2000	Introduction to Engineering Co-op Education	1
ENCP 3000	Professional Issues in Engineering	1
GE 1000	First-Year Seminar	1

Additional Required Courses

1 semester hour from the following counts toward the professional development requirement:		1
GE 1501	Cornerstone of Engineering 1 ¹	
1 semester hour from the following 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 in each course:		
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	

Integrative Courses

Code	Title	Hours
This course is already required above and also fulfills the integrative requirement.		
CHME 4512	Chemical Engineering Process Control	

Required General Electives

Code	Title	Hours
Complete 8 semester hours of academic, nonremedial courses not used toward other requirements.		8

Major GPA Requirement

Minimum 2.000 GPA required in CHME courses

Minimum 2.000 GPA required in CS, CY, DS, and IS courses

Program Requirement

135 total semester hours required (Additional hours may be required based on student choice of course options)

- 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 Plans of Study

FOUR YEARS, ONE CO-OP IN SUMMER SECOND HALF/FALL - DATA SCIENCE OPTION

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 (ND)		4 GE 1502 (ER)		4 CHME 2308		4 Vacation	
CHEM 1153	0	MATH 1342 (FQ)	4	MATH 2321 (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		8		0
Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHME 2320		4 CHME 2310		4 CS 3200 (FQ, AD)		4 Vacation	
CS 1800 (FQ)	4	ENCP 2000	1	ENGW 3302, 3307, or 3315 (WD)	4		
CS 1802	1	DS 2500	4				
MATH 2341	4	DS 2501	1				
CS 2000 and CS 2001	5	General elective	4				
		MATH 3081	4				
	18		18		8		0
Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHME 3312	4	CHME 3305	4	Vacation		Co-op	0
CHME 3322	4	CHME 3306	0				

4 Chemical Engineering and Data Science, BSChE (Boston)

DS 3000	4	CHME 4510	4
DS 3500	4	CHME 4701	4
		DS 4200	4
		ENCP 3000	1
	16		17
			0
			0

Year 4			
Fall	Hours	Spring	Hours
Co-op	0	CHME 4512	4
		CHME 4703 (EI, WI, CE)	4
		CHME 4705	0
		DS 4300	4
		DS 4400	4
	0		16

Total Hours: 135

FOUR YEARS, ONE CO-OP IN SUMMER SECOND HALF/FALL - COMPUTER SCIENCE OPTION

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 (ND)	4	GE 1502 (ER)	4	CHME 2308		4 Vacation	
CHEM 1153	0	MATH 1342 (FQ)	4	MATH 2321 (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			8	0

Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHME 2320	4	CHME 2310	4	CS 3200 (FQ, AD)		4 Vacation	
CS 1800 (FQ)	4	ENCP 2000	1	ENGW 3302, 3307, or 3315 (WD)		4	
CS 1802	1	CS 2100	4				
MATH 2341	4	CS 2101	1				
CS 2000 and CS 2001	5	MATH 3081	4				
		General elective	4				
	18		18			8	0

Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHME 3312	4	CHME 3305	4	Vacation		Co-op	0
CHME 3322	4	CHME 3306	0				
DS 3000	4	CHME 4510	4				
CS 3100	4	CHME 4701	4				
CS 3101	1	DS 4200	4				
		ENCP 3000	1				
	17		17			0	0

Year 4			
Fall	Hours	Spring	Hours
Co-op	0	CHME 4512	4
		CHME 4703 (EI, WI, CE)	4
		CHME 4705	0
		DS 4300	4

DS 4400	4
0	16

Total Hours: 136

FOUR YEARS, ONE CO-OP IN SPRING/SUMMER FIRST HALF - DS PATHWAY**Year 1**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153		4 GE 1502		4 CHME 2308		4 Vacation	
ENGW 1111		4 MATH 1342		4 MATH 2321		4	
GE 1000		1 PHYS 1151 and PHYS 1152 and PHYS 1153		5			
GE 1501		4 General Elective		4			
MATH 1341		4					
	17		17		8		0

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHME 2320		4 CHME 2310		4 CS 3200		4 Vacation	
CS 1800 and CS 1802		5 DS 2500 and DS 2501		5 ENGW 3302, 3307, or 3315 (WD)		4	
MATH 2341		4 ENCP 2000		1			
CS 2000 and CS 2001		5 MATH 3081		4			
		General Elective		4			
	18		18		8		0

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHME 3312		4 Co-op		0 Co-op		0 Vacation	
CHME 3322		4					
DS 3000		4					
DS 3500		4					
ENCP 3000		1					
	17		0		0		0

Year 4

Fall	Hours	Spring	Hours
CHME 3305 and CHME 3306		4 CHME 4512	4
CHME 4510		4 CHME 4703	4
CHME 4701		4 CHME 4705	0
DS 4200		4 DS 4300	4
		DS 4400	4
	16		16

Total Hours: 135

FOUR YEARS, ONE CO-OP IN SPRING/SUMMER FIRST HALF - CS PATHWAY**Year 1**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153		4 GE 1502		4 CHME 2308		4 Vacation	
ENGW 1111		4 MATH 1342		4 MATH 2321		4	
GE 1000		1 PHYS 1151 and PHYS 1152 and PHYS 1153		5			
GE 1501		4 General Elective		4			

MATH 1341	4							
	17			17		8		0
Year 2								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	
CHME 2320	4	CHME 2310	4	CS 3200	4	Vacation		
CS 1800 and CS 1802	5	ENCP 2000	1	ENGW 3302, 3307, or 3315 (WD)	4			
MATH 2341	4	CS 2100 and CS 2101	5					
CS 2000 and CS 2001	5	MATH 3081	4					
		General Elective	4					
	18		18		8			0
Year 3								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	
CHME 3312	4	Co-op	0	Co-op	0	Vacation		
CHME 3322	4							
DS 3000	4							
CS 3100 and CS 3101	5							
ENCP 3000	1							
	18		0		0			0
Year 4								
Fall	Hours	Spring	Hours					
CHME 3305 and CHME 3306	4	CHME 4512	4					
CHME 4510	4	CHME 4703	4					
CHME 4701	4	CHME 4705	0					
DS 4200	4	DS 4300	4					
		DS 4400	4					
	16		16					

Total Hours: 136

FIVE YEARS, THREE CO-OPS IN SPRING/SUMMER FIRST HALF - DS PATHWAY

Year 1								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	
CHEM 1151 and CHEM 1153	4	GE 1502	4	CHME 2308	4	Vacation		
ENGW 1111	4	MATH 1342	4	MATH 2321	4			
GE 1000	1	PHYS 1151 and PHYS 1152 and PHYS 1153	5					
GE 1501	4	General Elective	4					
MATH 1341	4							
	17		17		8			0
Year 2								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	
CHME 2310	4	Co-op	0	Co-op	0	CHME 2320	4	
CS 1800 and CS 1802	5					ENGW 3302, 3307, or 3315 (WD)	4	
ENCP 2000	1							
CS 2000 and CS 2001	5							

MATH 2341	4							
	19		0		0		8	
Year 3								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	
CHME 3312	4	Co-op	0	Co-op	0	Vacation		
CHME 3322	4							
DS 3000	4							
DS 2500 and DS 2501	5							
	17		0		0		0	
Year 4								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	
CHME 3305 and CHME 3306	4	Co-op	0	Co-op	0	Vacation		
DS 4200	4							
ENCP 3000	1							
MATH 3081	4							
CS 3200	4							
	17		0		0		0	
Year 5								
Fall	Hours	Spring	Hours					
CHME 4510	4	CHME 4512	4					
CHME 4701	4	CHME 4703	4					
DS 3500	4	CHME 4705	0					
General Elective	4	DS 4300	4					
		DS 4400	4					
	16		16					

Total Hours: 135

FIVE YEARS, THREE CO-OPS IN SPRING/SUMMER FIRST HALF - CS PATHWAY

Year 1									
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours		
CHEM 1151 and CHEM 1153		4 GE 1502		4 CHME 2308		4 Vacation			
ENGW 1111		4 MATH 1342		4 MATH 2321		4			
GE 1000		1 PHYS 1151 and PHYS 1152 and PHYS 1153		5					
GE 1501		4 General Elective		4					
MATH 1341		4							
	17		17		8		0		
Year 2									
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours		
CHME 2310		4 Co-op		0 Co-op		0 CHME 2320	4		
CS 1800 and CS 1802		5				ENGW 3302, 3307, or 3315 (WD)	4		
ENCP 2000		1							
CS 2000 and CS 2001		5							
MATH 2341		4							
	19		0		0		8		
Year 3									
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours		
CHME 3312		4 Co-op		0 Co-op		0 Vacation			

CHME 3322	4							
DS 3000	4							
CS 2100 and CS 2101	5							
	17			0			0	0

Year 4									
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours		
CHME 3305 and CHME 3306		4 Co-op		0 Co-op		0 Vacation			
DS 4200		4							
ENCP 3000		1							
MATH 3081		4							
CS 3200		4							
	17		0		0		0		

Year 5			
Fall	Hours	Spring	Hours
CHME 4510		4 CHME 4512	4
CHME 4701		4 CHME 4703	4
CS 3100 and CS 3101		5 CHME 4705	0
General Elective		4 DS 4300	4
		DS 4400	4
	17		16

Total Hours: 136

FIVE YEARS, THREE CO-OPS IN SUMMER SECOND HALF/FALL - DS PATHWAY

Year 1									
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours		
CHEM 1151 (ND)		4 GE 1502 (ER)		4 CHME 2308		4 Vacation			
CHEM 1153		0 MATH 1342 (FQ)		4 MATH 2321 (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		8		0		

Year 2									
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours		
CHME 2320		4 CHME 2310		4 Vacation		Co-op			0
CS 1800 (FQ)		4 ENCP 2000		1					
CS 1802		1 DS 2500		4					
CS 2000 and CS 2001		5 DS 2501		1					
MATH 2341		4 MATH 3081		4					
		General elective		4					
	18		18		0		0		

Year 3									
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours		
Co-op		0 CHME 3312		4 CS 3200 (FQ, AD)		4 Co-op		0	
		CHME 3322		4 ENG 3302, 3307, or 3315 (WD)		4			
		DS 3000		4					
		DS 3500		4					
	0			16		8			0

Year 4							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		0 CHME 3305		4 Vacation		Co-op	0
		CHME 3306		0			
		CHME 4510		4			
		CHME 4701		4			
		ENCP 3000		1			
		DS 4200		4			
	0		17		0		0

Year 5							
Fall	Hours	Spring	Hours				
Co-op		0 CHME 4512 (EI, CE, WI)	4				
		CHME 4703	4				
		CHME 4705	0				
		DS 4300	4				
		DS 4400	4				
	0		16				

Total Hours: 135

FIVE YEARS, THREE CO-OPS IN SUMMER SECOND HALF/FALL - CS PATHWAY

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 (ND)		4 GE 1502 (ER)		4 CHME 2308		4 Vacation	
CHEM 1153		0 MATH 1342 (FQ)		4 MATH 2321 (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		8		0

Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHME 2320		4 CHME 2310		4 Vacation		Co-op	0
CS 1800 (FQ)		4 ENCP 2000	1				
CS 1802		1 MATH 3081	4				
CS 2000 and CS 2001		5 CS 2100 and CS 2101	5				
MATH 2341		4 General elective	4				
	18		18		0		0

Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		0 CHME 3312		4 CS 3200 (FQ, AD)		4 Co-op	0
		CHME 3322		4 ENGW 3302, 3307, or 3315 (WD)		4	
		DS 3000		4			
		CS 3100 and CS 3101		5			
	0		17		8		0

Year 4							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		0 CHME 3305		4 Vacation		Co-op	0
		CHME 3306		0			
		CHME 4510		4			
		CHME 4701		4			

		ENCP 3000	1		
		DS 4200	4		
		0	17	0	0
Year 5					
Fall	Hours	Spring	Hours		
Co-op	0	CHME 4512 (EI, CE, WI)	4		
		CHME 4703	4		
		CHME 4705	0		
		DS 4300	4		
		DS 4400	4		
		0	16		

Total Hours: 136