Environmental Engineering and Data Science, BSEnvE (Boston)

The environmental engineering and data science combined major strategically blends together the two disciplines, allowing environmental engineering students to acquire data analytics skills that are becoming increasingly important in the field of environmental engineering as new data sources generate large databases.

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/).

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
Required Engineering		
CIVE 2221 and CIVE 2222	Statics and Solid Mechanics and Recitation for CIVE 2221	4
CIVE 2300 and CIVE 2301	Environmental Measurements in Natural and Engineered Systems and Lab for CIVE 2300	4
CIVE 2331	Fluid Mechanics and Hydraulics	4
CIVE 2334	Environmental Engineering: Principles, Technology, and Sustainability	4
CIVE 3435	Environmental Pollution: Fate and Transport	4
CIVE 4534 and CIVE 4535	Water Treatment Systems Design and Lab for CIVE 4534	4
CIVE 4765	Senior Design Project—Environmental	5
Environmental Engineering Elective Courses		
Complete at least one of the following:		4
CIVE 3335	Environmental Engineering Chemistry and Chemical Technologies	
CIVE 4540	Resource Recovery and Waste Treatment Technologies Abroad	
CIVE 4777	Climate Hazards and Resilient Cities Abroad	
CIVE 5100	Equity in Engineering	
CIVE 5150	Climate and Atmospheric Change	
CIVE 5250	Organic Pollutants in the Environment	
CIVE 5255	Tools and Techniques of Environmental Health	
CIVE 5260	Environmental Fluid Mechanics	
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
CIVE 5366	Air Quality Engineering and Science	

CIVE 5368	Air Quality Management	
CIVE 5369	Atmospheric Boundary Layer Flows	
CIVE 5536	Hydrologic and Hydraulic Design	
CIVE 5670	Global Biogeochemistry	
CIVE 5699	Special Topics in Civil Engineering	
GE 3300	Energy Systems: Science, Technology, and Sustainability	
Supplemental Credit		
3 semester hours from the following counts toward the engineering requirement:		3
CIVE 3430	Engineering Microbiology and Ecology	
or EEMB 3455	Ecosystems Ecology	
2 semester hours from the following counts toward the engineering requirement:		2
GE 1501	Cornerstone of Engineering 1 [1]	
3 semester hours from the following counts toward the engineering requirement:		3
GE 1502	Cornerstone of Engineering 2 [1]	

Data Science Major Requirements

Code	Title	Hours
Computer Science Requirements		
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 with 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 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 Requirements		
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.[2]

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	Probability and Statistics	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 (Earth)		
Complete one of the following:		4
ENVR 1200	Dynamic Earth	
ENVR 2200	Earth's Changing Cycles	
ENVR 3125	Global Oceanic Change	
ENVR 3200	Water Resources	
ENVR 3600	Oceanography	
ENVR 5201	Geologic Field Seminar	
Supplemental Credit		
1 semester hour from the following counts toward the mathematics/science requirement:		1
CIVE 3430	Engineering Microbiology and Ecology	
or EEMB 3455	Ecosystems Ecology	
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
Professional Development		
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:		
ENGW 1111	First-Year Writing	4
ENGW 3302	Advanced Writing in the Technical Professions	4
or ENGW 3303	Advanced Writing in the Environmental Professions	
or ENGW 3315	Interdisciplinary Advanced Writing in the Disciplines	

Integrative Course

Code	Title	Hours
This course is already required above and also fulfills the integrative requirement:		
CIVE 4765	Senior Design Project—Environmental	

General Electives

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

Engineering GPA Requirement

Minimum 2.000 GPA required in major (CIVE) courses

Data Science Major Requirement

Minimum 2.000 GPA required in all CS and DS courses

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).

2 Mathematics/science requirement: General Chemistry for Engineers (CHEM 1151), Calculus 1 for Science and Engineering (MATH 1341), and Physics for Engineering 1 (PHYS 1151) require a grade of C– or higher.

Plan of Study

Sample Plans of Study

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

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153 (ND)	4	GE 1502 (ER)	4	CIVE 2221 and CIVE 2222	4	Vacation	
ENGW 1111 (WF)	4	MATH 1342 (FQ)	4	CS 2000 and CS 2001	5		
GE 1000	1	PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)	5				
GE 1501	4	General Elective	4				
MATH 1341 (FQ)	4						
	17		**17**		**9**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
MATH 2321	4	MATH 2341	4	CS 1800 and CS 1802	5	Co-op	0
CIVE 2334	4	CIVE 2331	4	MATH 3081	4		
CIVE 2300 and CIVE 2301	4	CIVE 3430	4				
Programming Pathway Course	4	ENCP 2000	1				
		Programming Pathway Course	5				
	16		**18**		**9**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	DS 3000	4	Vacation		Vacation	
		CS 3200	4				
		ENGW 3302	4				
		CIVE 3435	4				
	0		**16**		**0**		**0**

Year 4

Fall	Hours	Spring	Hours
CIVE 4534 and CIVE 4535 (WI)	4	CIVE 4765 (EI, WI, CE)	5
DS 4200	4	DS 4300	4
Environmental Engineering Elective	4	DS 4400	4
Earth Science Elective	4	General elective	4
ENCP 3000	1		
	17		**17**

Total Hours: 136

FOUR YEARS, ONE CO-OP IN SPRING/SUMMER FIRST HALF

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153	4	GE 1502	4	CIVE 2221 and CIVE 2222	4	Vacation	
ENGW 1111	4	MATH 1342	4	CS 2000 and CS 2001	5		
GE 1000	1	PHYS 1151 and PHYS 1152 and PHYS 1153	5				
GE 1501	4	General Elective	4				
MATH 1341	4						
	17		**17**		**9**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
MATH 2321	4	MATH 2341	4	MATH 3081	4	Vacation	
CIVE 2334	4	CIVE 2331	4	CS 1800 and CS 1802	5		
CIVE 2300 and CIVE 2301	4	CIVE 3430	4				
Programming Pathway Course	5	Programming Pathway Course	4				
		ENCP 2000	1				
	17		**17**		**9**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CIVE 3435	4	Co-op	0	Co-op	0	Vacation	
DS 3000	4						
CS 3200	4						
ENGW 3302	4						
	16		**0**		**0**		**0**

Year 4

Fall	Hours	Spring	Hours
CIVE 4534 and CIVE 4535	4	CIVE 4765	5
Environmental engineering elective	4	DS 4300	4
DS 4200	4	DS 4400	4
Earth Science Elective	4	General elective	4
ENCP 3000	1		
	17		**17**

Total Hours: 136

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

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153 (ND)	4	MATH 1342 (FQ)	4	CIVE 2221 and CIVE 2222	4	Vacation	
ENGW 1111 (WF)	4	PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)	5	CS 2000 and CS 2001	5		
GE 1000	1	GE 1502 (ER)	4				
GE 1501	4	General Elective	4				
MATH 1341 (FQ)	4						
	17		**17**		**9**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CIVE 2334	4	ENCP 2000	1	MATH 3081	4	Co-op	0
CIVE 2300 and CIVE 2301	4	MATH 2341	4	CS 1800 and CS 1802	5		
MATH 2321	4	CIVE 2331	4				
Programming Pathway Course	5	CIVE 3430	4				
		Programming Pathway Course	4				
	17		**17**		**9**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	CIVE 3435	4	Vacation		Co-op	0
		DS 3000	4				
		CS 3200	4				
		ENGW 3302	4				
	0		**16**		**0**		**0**

Year 4

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	DS 4200	4	Vacation		Co-op	0
		CIVE 4534 and CIVE 4535	4				
		Environmental engineering elective	4				
		Earth Science Elective	4				
		ENCP 3000	1				
	0		**17**		**0**		**0**

Year 5

Fall	Hours	Spring	Hours
Co-op	0	CIVE 4765	5
		DS 4300	4
		DS 4400	4
		General elective	4
	0		**17**

Total Hours: 136

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

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153	4	GE 1502	4	CIVE 2221 and CIVE 2222	4	Vacation	
GE 1000	1	MATH 1342	4	CS 2000 and CS 2001	5		
GE 1501	4	PHYS 1151 and PHYS 1152 and PHYS 1153	5				
ENGW 1111	4	General elective	4				
MATH 1341	4						
	17		**17**		**9**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
MATH 2321	4	Co-op	0	Co-op	0	MATH 2341	4
CIVE 2334	4					General elective	4

CIVE 2300 and CIVE 2301	4						
ENCP 2000	1						
Programming Pathway Course	5						
	18		**0**		**0**		**8**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CIVE 2331	4	Co-op	0	Co-op	0	Vacation	
CIVE 3430	4						
CS 1800 and CS 1802	5						
Programming Pathway Course	4						
	17		**0**		**0**		**0**

Year 4

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CIVE 3435	4	Co-op	0	Co-op	0	Vacation	
DS 3000	4						
CS 3200	4						
MATH 3081	4						
	16		**0**		**0**		**0**

Year 5

Fall	Hours	Spring	Hours
CIVE 4534 and CIVE 4535	4	CIVE 4765	5
DS 4200	4	DS 4300	4
Environmental Engineering Elective	4	DS 4400	4
ENCP 3000	1	Earth science elective	4
ENGW 3302	4		
	17		**17**

Total Hours: 136