

Data Science and Environmental and Sustainability Sciences, BS

The data science and environmental and sustainability sciences combined major focuses on major environmental challenges facing our planet and provides broad training to understand how these challenges can be met through advances in data science. Understanding these processes requires acquisition and analysis of large amounts of data—an ideal fit with data science, where students study the collection, manipulation, storage, retrieval, and computational analysis of data in its various forms, including numeric, textual, image, and video data from small to large volumes.

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.

University-Wide Requirements

All undergraduate students are required to complete the University-Wide 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/nuopath/>).

Data Science Courses

Code	Title	Hours
Computer Science Overview		
CS 1200	First Year Seminar	1
CS 1210	Professional Development for Khoury Co-op	1
Programming Sequence Pathways		
Choose one of the two options:		12
<i>Computer Science Option</i>		
CS 2500 and CS 2501	Fundamentals of Computer Science 1 and Lab for CS 2500	
CS 2510 and CS 2511	Fundamentals of Computer Science 2 and Lab for CS 2510	
CS 3500	Object-Oriented Design	
<i>Data Science Option</i>		
DS 2000 and DS 2001	Programming with Data and Data Science Programming Practicum	
DS 2500 and DS 2501	Intermediate Programming with Data and Lab for DS 2500	
DS 3500	Advanced Programming with Data	
Computer Science Required Courses		
CS 3200	Database Design	4
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
DS 4420	Machine Learning and Data Mining 2	4

Khoury Elective Courses

With advisor approval, directed study, research, project study, and appropriate graduate-level courses may also be taken as upper-division electives.

Complete 4 credits of CS, CY, DS, or IS classes that are not already required. Choose courses within the following ranges:		4
CS 2500 or higher, except CS 5010		
CY 2000 or higher, except CY 4930		
DS 2500 or higher, except DS 4900		
IS 2000 or higher, except IS 4900		

Environmental Science and Sustainability Courses

Code	Title	Hours
Environmental and Sustainability Sciences Major Requirements		
ENVR 1400 and ENVR 1401	Foundations in Environmental and Sustainability Sciences and Lab for ENVR 1400	5
ENVR 2200 or ENVR 1200	Earth's Changing Cycles Dynamic Earth	4
EEMB 2302 and EEMB 2303	Ecology and Lab for EEMB 2302	5
ENVR 2515	Sustainable Development	4
Choose one course from each category:		
<i>Skills Courses</i>		4-5
ENVR 3300 and ENVR 3301 or EEMB 3555	Geographic Information Systems and Lab for ENVR 3300 Networks and Natural Systems	
<i>Earth Oceans and Environmental Change</i>		4-5
ENVR 2310 and ENVR 2311	Earth Materials and Lab for ENVR 2310	
ENVR 3600	Oceanography	
ENVR 3125	Global Oceanic Change	
ENVR 4500 and ENVR 4501	Applied Hydrogeology and Lab for ENVR 4500	
<i>Conservation, Restoration, and Management</i>		4
EEMB 2400	Introduction to Evolution	
EEMB 3460	Conservation Biology	
EEMB 4001	Landscape and Restoration Ecology	
EEMB 3465	Ecological and Conservation Genomics	
<i>Sustainable Planning and Development</i>		4
ENVR 3200	Water Resources	
ENVR 3150	Food Security and Sustainability	
ENVR 5210	Environmental Planning	
ENVR 5350	Sustainable Energy and Climate Solutions	
<i>Environment and Society</i>		4
POLS 2395	Environmental Politics and Policy	

PPUA 5260	Ecological Economics
PPUA 5268	International Environmental Policy
SOCL 2485	Environment, Technology, and Society

Supporting Courses

Code	Title	Hours
Calculus		
MATH 1251	Calculus and Differential Equations for Biology 1	4
or MATH 1341	Calculus 1 for Science and Engineering	
ENVR 2500 and ENVR 2501	Biostatistics and Lab for ENVR 2500	5
Chemistry		
CHEM 1211 and CHEM 1212 and CHEM 1213	General Chemistry 1 and Lab for CHEM 1211 and Recitation for CHEM 1211	5
CHEM 1214 and CHEM 1215 and CHEM 1216	General Chemistry 2 and Lab for CHEM 1214 and Recitation for CHEM 1214	5

Computer Science English Requirement

Code	Title	Hours
College Writing		
ENGW 1111 or ENGW 1102	First-Year Writing or First-Year Writing for Multilingual Writers	4
Advanced Writing in the Disciplines		
Complete one of the following:		4
ENGW 3302	Advanced Writing in the Technical Professions	
ENGW 3307	Advanced Writing in the Sciences	
ENGW 3315	Interdisciplinary Advanced Writing in the Disciplines	

Integrative Requirement

Code	Title	Hours
Complete one of the following:		4
ENVR 4050	Solving Emerging Environmental Challenges through Capstone	
ENVR 4971	Junior/Senior Honors Project 2	
ENVR 4997	Senior Thesis	
CS 4991	Research	

Required General Electives

Code	Title	Hours
Complete 24 credits of general electives.		24

Khoury College GPA Requirement

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

NUpath Requirements Satisfied

- Engaging with the Natural and Designed World
- Conducting Formal and Quantitative Reasoning
- Analyzing and Using Data

- Writing in the First Year
- Advanced Writing in the Disciplines
- Writing-Intensive in the Major
- Demonstrating Thought and Action in a Capstone

Integrating Knowledge and Skills Through Experience is satisfied through co-op.

Program Requirement

134 total semester hours required

Plan of Study

Sample Patterns

Four Years, Two Co-ops in Summer 2/Fall

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1200		1 CS 2510 and CS 2511	5	CS 3500	4	Elective	4
CS 1800 and CS 1802	5	ENVR 2515	4	CS 3200	4	Elective	4
CS 2500 and CS 2501	5	ENVR 1400 and ENVR 1401	5				
ENVR 2200	4	EEMB 2302 and EEMB 2303	5				
ENGW 1111	4						
		19		19		8	

Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1211 and CHEM 1212 and CHEM 1213	5	CHEM 1214 and CHEM 1215 and CHEM 1216	5	MATH 1341 or 1251	4	Co-op	4
DS 3000	4	DS 4200	4	Elective	4		4
ENVR skills course	4	ENVR 2500	4				
ENVR Earth oceans course	4	DS 4300	4				
		CS 1210		1			
		17		18		8	

Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		DS 4400	4	ENGW 3302	4	Co-op	4
		ENVR conservation course	4	Elective	4		4
		ENVR sustainable course	4				

	ENVR society course	4		
		0	16	8
				0

Year 4

Fall	Hours Spring	Hours		
Co-op	Integrative course	4		
	DS 4420	4		
	Khoury elective	4		
	Elective	4		
	Elective	4		
		0	20	

Total Hours: 141

Five Years, Three Co-ops in Summer 2/Fall

Year 1

Fall	Hours Spring	Hours Summer 1	Hours Summer 2	Hours
CS 1200	1 CS 2510 and CS 2511	5 Vacation	Vacation	
CS 1800 and CS 1802	5 CS 3200	4		
CS 2500 and CS 2501	5 EEMB 2302 and EEMB 2303	5		
ENVR 2200	4 ENVR 1400 and ENVR 1401	5		
ENGW 1111	4			
	19	19	0	0

Year 2

Fall	Hours Spring	Hours Summer 1	Hours Summer 2	Hours
CS 3500	4 CHEM 1214 and CHEM 1215 and CHEM 1216	5 Vacation	Co-op	
CHEM 1211 and CHEM 1212 and CHEM 1213	5 DS 3000	4		
ENVR 2515	4 ENVR 2500	4		
ENVR skills course	4 ENVR Earth oceans course	4		
	CS 1210	1		
	17	18	0	0

Year 3

Fall	Hours Spring	Hours Summer 1	Hours Summer 2	Hours
Co-op	0 MATH 1251 or 1341	4 Elective	4 Co-op	
	DS 4200	4 Elective	4	
	ENVR conservation course	4		

	ENVR sustainable course	4		
		0	16	8
				0

Year 4

Fall	Hours Spring	Hours Summer 1	Hours Summer 2	Hours
Co-op	0 DS 4300	4 Elective	4 Co-op	
	DS 4400	4 ENGW 3302	4	
	ENVR society course	4		
	Elective	4		
		0	16	8
				0

Year 5

Fall	Hours Spring	Hours
Co-op	DS 4420	4
	Integrative course	4
	Khoury elective	4
	Elective	4
	Elective	4
		0
		20

Total Hours: 141