Data Science and Environmental and Sustainability Sciences, BS (Boston)

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.

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/).

Data Science Courses

Code	Title	Hours
Computer Science Overview		
Must be taken in alignment with your home college:		
CS 1200	First Year Seminar	1
or INSC 1000	Science at Northeastern	
CS 1210	Professional Development for Khoury Co-op	1
or EESC 2000	Professional Development for Co-op	
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 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		
Choose one of the two options:		9
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
DS 4420	Machine Learning and Data Mining 2	4
Khoury Approved Electives		

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

Complete 4 semester hours from within the following options:		4
CS 2500 or higher, except CS 5010		
CY 2000 or higher, except CY 4930		
DS 2500 or higher, except DS 4900		
MKTG 4606	Digital, Analytics, Technology, and Automation Research Practicum	

Environmental Science and Sustainability Courses

Code	Title	Hours
Environmental and Sustainability Sciences Major Requirements		
EEMB 2302 and EEMB 2303	Ecology and Lab for EEMB 2302	5
ENVR 1400 and ENVR 1401	Foundations in Environmental and Sustainability Sciences and Lab for ENVR 1400	5
ENVR 1200 and ENVR 1201	Dynamic Earth and Lab for ENVR 1200	4-5
or ENVR 2200	Earth's Changing Cycles	
ENVR 2515	Sustainable Development	4
Skills Courses		
Complete one of the following:		4-5
ENVR 3300 and ENVR 3301	Geographic Information Systems and Lab for ENVR 3300	
ENVR 5260	Geographical Information Systems	
Environmental and Sustainability Sciences Electives		
Complete any 4 courses from this list:		16-19
ENVR 4970	Junior/Senior Honors Project 1	
Earth Oceans and Environmental Change		
ENVR 2310 and ENVR 2311	Earth Materials and Lab for ENVR 2310	
ENVR 2340 and ENVR 2341	Earth Landforms and Processes and Lab for ENVR 2340	
ENVR 3125	Global Oceanic Change	
or ENVR 3600	Oceanography	
ENVR 4500 and ENVR 4501	Applied Hydrogeology and Lab for ENVR 4500	
ENVR 5150	Climate and Atmospheric Change	
ENVR 5190	Soil Science	
ENVR 5600	Coastal Processes, Adaptation, and Resilience	
ENVR 5670	Global Biogeochemistry	
Conservation, Restoration, and Management		
EEMB 2400	Introduction to Evolution	
EEMB 3460	Conservation Biology	
EEMB 3465	Ecological and Conservation Genomics	
EEMB 4001	Landscape and Restoration Ecology	
ENVR 4505	Wetlands	
ENVR 5700	Streams and Watershed Ecology	
ENVR 5750	Urban Ecology	
Sustainable Planning and Development		
ENVR 3150	Food Security and Sustainability	
ENVR 3200	Water Resources	
ENVR 5000	Community Stakeholder Engagement in Environmental Management and Research	
ENVR 5210	Environmental Planning	
ENVR 5350	Sustainable Energy and Climate Solutions	

ENVR 5563	Advanced Spatial Analysis
ENVR 5800	Climate Adaptation and Nature-Based Solutions
Environment and Society	
ENVR 5220	Ecosystem-Based Management
ENVR 5450	Applied Social-Ecological Systems Modeling
ENVR 5800	Climate Adaptation and Nature-Based Solutions
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 1341	Calculus 1 for Science and Engineering	4
ENVR 2500 and ENVR 2501	Biostatistics and Lab for ENVR 2500	5
Chemistry		
CHEM 1161 and CHEM 1162 and CHEM 1163	General Chemistry for Science Majors and Lab for CHEM 1161 and Recitation for CHEM 1161	5

Computer Science English Requirement

Code	Title	Hours
College Writing		
ENGW 1111	First-Year Writing	4
or ENGW 1102	First-Year Writing for Multilingual Writers	
Advanced Writing in the Disciplines		
Complete one of the following:		4
ENGW 3302	Advanced Writing in the Technical Professions	
ENGW 3303	Advanced Writing in the Environmental 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
CS 4991	Research	
ENVR 4050	Solving Emerging Environmental Challenges through Capstone	
ENVR 4971	Junior/Senior Honors Project 2	
ENVR 4997	Senior Thesis	

Required General Electives

Code	Title	Hours
Complete 16 semester hours of general electives.		16

Khoury College GPA Requirement

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

Science GPA Requirement (Environmental and Sustainability Sciences)

A minimum 2.000 GPA in the following course codes is required: ENVR, EEMB

NUpath Requirements Satisfied

- Advanced Writing in the Disciplines
- Analyzing and Using Data

- `Demonstrating Thought and Action in a Capstone`

- Engaging with the Natural and Designed World
- Conducting Formal and Quantitative Reasoning
- Exploring Creative Expression and Innovation
- Understanding Societies and Institutions
- Writing in the First Year
- Writing-Intensive in the Major

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

Program Requirement

131 total semester hours required

Plan of Study

Sample Plan of Study

FOUR YEARS, TWO CO-OPS IN SUMMER SECOND HALF/FALL

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1200	1	DS 2500 and DS 2501	5	CS 3200	4	Elective	4
CS 1800 and CS 1802	5	EEMB 2302 and EEMB 2303	5	MATH 1341	4	Elective	4
ENGW 1111	4	ENVR 1400 and ENVR 1401	5				
CS 2000 and CS 2001	5	ENVR 2515	4				
ENVR 2200 or 1200 ***and*** 1201	4						
	19		**19**		**8**		**8**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1211 and CHEM 1212 and CHEM 1213	5	CS 1210	1	Elective	4	Co-op	0
DS 3000	4	CHEM 1214 and CHEM 1215 and CHEM 1216	5	Elective	4		
ENVR skills course	4	DS 3500	4				
ENVR Elective	4	DS 4200	4				
		ENVR 2500	4				
	17		**18**		**8**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	DS 4300	4	ENGW 3302, 3303, 3307, or 3315	4	Co-op	0
		DS 4400	4				
		ENVR Elective	4				
		ENVR Elective	4				
	0		**16**		**4**		**0**

Year 4

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

		ENVR Elective	4				
	0		**16**				

Total Hours: 133

FOUR YEARS, TWO CO-OPS IN SPRING/SUMMER FIRST HALF

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1200	1	DS 2500 and DS 2501	5	CS 3200	4	Elective	4
CS 1800 and CS 1802	5	EEMB 2302 and EEMB 2303	5	MATH 1341	4	Elective	4
ENGW 1111	4	ENVR 1400 and ENVR 1401	5				
CS 2000 and CS 2001	5	ENVR 2515	4				
ENVR 2200 or 1200 ***and*** 1201	4						
	19		**19**		**8**		**8**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1210	1	Co-op	0	Co-op	0	Elective	4
CHEM 1211 and CHEM 1212 and CHEM 1213	5					Elective	4
DS 3000	4						
ENVR Elective	4						
ENVR Elective	4						
	18		**0**		**0**		**8**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1214 and CHEM 1215 and CHEM 1216	5	Co-op	0	Co-op	0	ENGW 3302, 3303, 3307, or 3315	4
DS 3500	4						
DS 4200	4						
ENVR 2500	4						
	17		**0**		**0**		**4**

Year 4

Fall	Hours	Spring	Hours
DS 4300	4	DS 4420	4
DS 4400	4	Integrative course	4
ENVR Elective	4	Khoury elective	4
Sustainable Planning and Development Course	4	ENVR Elective	4
	16		**16**

Total Hours: 133