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.

Universitywide Requirements
All undergraduate students are required to complete the Universitywide 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/nupath/).

Data Science Courses

### Computer Science Overview
- **CS 1200** or **ENVR 1000**: First Year Seminar or Marine and Environmental Sciences at Northeastern (1)
- **CS 1210**: Professional Development for Khoury Co-op (1)
- **CS 2500** or **EESC 2000**: Professional Development for Co-op (12)

### Programming Sequence Pathways
Choose one of the two options: 12

**Computer Science Option**
- **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

**Data Science Option**
- **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 1800** and **CS 1802**: Discrete Structures and Seminar for CS 1800 (5)

### Data Science Foundations
- **CS 3200**: Database Design (4)

### Environmental Science and Sustainability Courses

#### 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)
- **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 Earth Oceans and Environmental Change
Complete one of the following: 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
- **ENVR 5150**: Climate and Atmospheric Change
- **ENVR 5600**: Coastal Processes, Adaptation, and Resilience
- **ENVR 5670**: Global Biogeochemistry

#### Conservation, Restoration, and Management
Complete one of the following: 4
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
Complete one of the following: 4
ENVR 3200 Water Resources
ENVR 3150 Food Security and Sustainability
ENVR 5210 Environmental Planning
ENVR 5350 Sustainable Energy and Climate Solutions
ENVR 5600 Coastal Processes, Adaptation, and Resilience
ENVR 5750 Urban Ecology
ENVR 5800 Climate Adaptation and Nature-Based Solutions

Environment and Society
Complete one of the following: 4
ENVR 5750 Urban Ecology
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 1251 Calculus and Differential Equations for Biology 1   4
or MATH 1341 Calculus 1 for Science and Engineering
ENVR 2500 Biostatistics and Lab for ENVR 2500   5
Chemistry
CHEM 1211 General Chemistry 1 and Lab for CHEM 1211   5
and CHEM 1212 and CHEM 1213 and Recitation for CHEM 1211
CHEM 1214 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 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 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 Plan of Study:
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    5 CS 3200      4 Elective    4
CS 1800 and CS 1802 5 EEMB 2302 and EEMB 2303 5 CS 3500 4 Elective 4
CS 2500 and CS 2501 5 ENVR 1400 and ENVR 1401 5
ENGW 1111 4 ENVR 2515 4
ENVR 2200 4

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
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| Year 3                          |            |              |                |                |       |
| Co-op                          | 17         | 18           | 8              | 0              |       |

| Year 4                          |            |              |                |                |       |
| Co-op                          | 0          | 16           | 8              | 20             |       |

Total Hours: 141