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 [here](https://catalog.northeastern.edu/undergraduate/university-academics/university-wide-requirements/).

**NUpath Requirements**

All undergraduate students are required to complete the NUpath Requirements [here](https://catalog.northeastern.edu/undergraduate/university-academics/nupath/).

**Data Science Courses**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td><strong>Computer Science Overview</strong></td>
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<tr>
<td>CS 1200</td>
<td>First Year Seminar</td>
<td>1</td>
</tr>
<tr>
<td>or ENVR 1000</td>
<td>Marine and Environmental Sciences at Northeastern Science at Northeastern</td>
<td></td>
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<tr>
<td>or INSC 1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 1210</td>
<td>Professional Development for Khoury Co-op</td>
<td>1</td>
</tr>
<tr>
<td>or EESC 2000</td>
<td>Professional Development for Co-op</td>
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**Programming Sequence Pathways**

Choose one of the two options: 12

**Computer Science Option**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>CS 2500</td>
<td>Fundamentals of Computer Science 1 and Lab for CS 2500</td>
</tr>
<tr>
<td>and CS 2501</td>
<td></td>
</tr>
<tr>
<td>CS 2510</td>
<td>Fundamentals of Computer Science 2 and Lab for CS 2510</td>
</tr>
<tr>
<td>and CS 2511</td>
<td></td>
</tr>
<tr>
<td>CS 3500</td>
<td>Object-Oriented Design</td>
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**Data Science Option**

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<tr>
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<tbody>
<tr>
<td>DS 2000</td>
<td>Programming with Data and Data Science Programming Practicum</td>
</tr>
<tr>
<td>and DS 2001</td>
<td></td>
</tr>
<tr>
<td>DS 2500</td>
<td>Intermediate Programming with Data and Lab for DS 2500</td>
</tr>
<tr>
<td>and DS 2501</td>
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<td>DS 3500</td>
<td>Advanced Programming with Data</td>
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**Computer Science Required Courses**

<table>
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<tr>
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<tr>
<td>CS 1800</td>
<td>Discrete Structures and Seminar for CS 1800</td>
</tr>
<tr>
<td>CS 1802</td>
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<tr>
<td>CS 3200</td>
<td>Database Design</td>
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**Data Science Foundations**

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<tr>
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<th>Title</th>
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</thead>
<tbody>
<tr>
<td>DS 3000</td>
<td>Foundations of Data Science</td>
</tr>
<tr>
<td>DS 4200</td>
<td>Information Presentation and Visualization</td>
</tr>
<tr>
<td>DS 4300</td>
<td>Large-Scale Information Storage and Retrieval</td>
</tr>
<tr>
<td>DS 4400</td>
<td>Machine Learning and Data Mining 1</td>
</tr>
<tr>
<td>DS 4420</td>
<td>Machine Learning and Data Mining 2</td>
</tr>
</tbody>
</table>

**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:

<table>
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<tr>
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<th>Title</th>
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<tbody>
<tr>
<td>CS 2500</td>
<td></td>
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<tr>
<td>or higher, except CS 5010</td>
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### Environmental and Sustainability Sciences Major Requirements

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>EEMB 2302</td>
<td>Ecology and Lab for EEMB 2302</td>
<td>5</td>
</tr>
<tr>
<td>EEMB 2303</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENVR 1400</td>
<td>Foundations in Environmental and Sustainability Sciences and Lab for ENVR 1400</td>
<td>5</td>
</tr>
<tr>
<td>ENVR 1401</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENVR 1200</td>
<td>Dynamic Earth and Lab for ENVR 1200</td>
<td>4-5</td>
</tr>
<tr>
<td>ENVR 1201</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENVR 2200</td>
<td>Earth's Changing Cycles</td>
<td></td>
</tr>
<tr>
<td>ENVR 2515</td>
<td>Sustainable Development</td>
<td>4</td>
</tr>
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</table>

#### Skills Courses

Complete one of the following: 4-5

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>ENVR 3300</td>
<td>Geographic Information Systems and Lab for ENVR 3300</td>
<td></td>
</tr>
<tr>
<td>ENVR 3301</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENVR 5260</td>
<td>Geographical Information Systems</td>
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#### Earth Oceans and Environmental Change

Complete one of the following: 4-5

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<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVR 2310</td>
<td>Earth Materials and Lab for ENVR 2310</td>
<td></td>
</tr>
<tr>
<td>ENVR 2311</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENVR 3600</td>
<td>Oceanography</td>
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</tr>
<tr>
<td>ENVR 3125</td>
<td>Global Oceanic Change</td>
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</tr>
<tr>
<td>ENVR 4500</td>
<td>Applied Hydrogeology and Lab for ENVR 4500</td>
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</tr>
<tr>
<td>ENVR 4501</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENVR 5150</td>
<td>Climate and Atmospheric Change</td>
<td></td>
</tr>
<tr>
<td>ENVR 5600</td>
<td>Coastal Processes, Adaptation, and Resilience</td>
<td></td>
</tr>
<tr>
<td>ENVR 5670</td>
<td>Global Biogeochemistry</td>
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#### Conservation, Restoration, and Management

Complete one of the following: 4

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEMB 2400</td>
<td>Introduction to Evolution</td>
<td></td>
</tr>
<tr>
<td>EEMB 3460</td>
<td>Conservation Biology</td>
<td></td>
</tr>
<tr>
<td>EEMB 3465</td>
<td>Ecological and Conservation Genomics</td>
<td></td>
</tr>
<tr>
<td>EEMB 4001</td>
<td>Landscape and Restoration Ecology</td>
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</tr>
<tr>
<td>ENVR 4505</td>
<td>Wetlands</td>
<td></td>
</tr>
<tr>
<td>ENVR 5700</td>
<td>Streams and Watershed Ecology</td>
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</tr>
<tr>
<td>ENVR 5750</td>
<td>Urban Ecology</td>
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</tr>
</tbody>
</table>

#### Sustainable Planning and Development

Complete one of the following: 4

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVR 3200</td>
<td>Water Resources</td>
<td></td>
</tr>
<tr>
<td>ENVR 3150</td>
<td>Food Security and Sustainability</td>
<td></td>
</tr>
<tr>
<td>ENVR 5210</td>
<td>Environmental Planning</td>
<td></td>
</tr>
<tr>
<td>ENVR 5350</td>
<td>Sustainable Energy and Climate Solutions</td>
<td></td>
</tr>
<tr>
<td>ENVR 5600</td>
<td>Coastal Processes, Adaptation, and Resilience</td>
<td></td>
</tr>
<tr>
<td>ENVR 5750</td>
<td>Urban Ecology</td>
<td></td>
</tr>
<tr>
<td>ENVR 5800</td>
<td>Climate Adaptation and Nature-Based Solutions</td>
<td></td>
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</table>

#### Environment and Society

Complete one of the following: 4

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVR 5750</td>
<td>Urban Ecology</td>
<td></td>
</tr>
<tr>
<td>ENVR 5800</td>
<td>Climate Adaptation and Nature-Based Solutions</td>
<td></td>
</tr>
<tr>
<td>POLS 2395</td>
<td>Environmental Politics and Policy</td>
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<tr>
<td>PPUA 5260</td>
<td>Ecological Economics</td>
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</table>
### Supporting Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1251</td>
<td>Calculus and Differential Equations for Biology 1</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1341</td>
<td>Calculus 1 for Science and Engineering</td>
<td></td>
</tr>
<tr>
<td>ENVR 2500</td>
<td>Biostatistics</td>
<td>5</td>
</tr>
<tr>
<td>and ENVR 2501</td>
<td>and Lab for ENVR 2500</td>
<td></td>
</tr>
</tbody>
</table>

#### Chemistry

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1211</td>
<td>General Chemistry 1</td>
<td>5</td>
</tr>
<tr>
<td>and CHEM 1212</td>
<td>and Lab for CHEM 1211</td>
<td></td>
</tr>
<tr>
<td>and CHEM 1213</td>
<td>and Recitation for CHEM 1211</td>
<td></td>
</tr>
<tr>
<td>CHEM 1214</td>
<td>General Chemistry 2</td>
<td>5</td>
</tr>
<tr>
<td>and CHEM 1215</td>
<td>and Lab for CHEM 1214</td>
<td></td>
</tr>
<tr>
<td>and CHEM 1216</td>
<td>and Recitation for CHEM 1214</td>
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</table>

### Computer Science English Requirement

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGW 1111</td>
<td>First-Year Writing</td>
<td>4</td>
</tr>
<tr>
<td>or ENGW 1102</td>
<td>First-Year Writing for Multilingual Writers</td>
<td></td>
</tr>
</tbody>
</table>

#### 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

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

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

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
<th>Summer 1</th>
<th>Hours</th>
<th>Summer 2</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>CS 1200</td>
<td>1</td>
<td>CS 2510</td>
<td>5</td>
<td>CS 3200</td>
<td>4</td>
<td>Elective</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>CS 1800 and CS 1802</td>
<td>5</td>
<td>EEMB 2302 and EEMB 2303</td>
<td>5</td>
<td>CS 3500</td>
<td>4</td>
<td>Elective</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>CS 2500 and CS 2501</td>
<td>5</td>
<td>ENVR 1400 and ENVR 1401</td>
<td>5</td>
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</tr>
<tr>
<td></td>
<td>ENGW 1111</td>
<td>4</td>
<td>ENVR 2515</td>
<td>4</td>
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<td></td>
<td>ENVR 2200</td>
<td>4</td>
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<table>
<thead>
<tr>
<th>Year 2</th>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
<th>Summer 1</th>
<th>Hours</th>
<th>Summer 2</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CHEM 1211 and CHEM 1212 and CHEM 1213</td>
<td>5</td>
<td>CHEM 1214 and CHEM 1215 and CHEM 1216</td>
<td>5</td>
<td>MATH 1341 or 1251</td>
<td>4</td>
<td>Co-op</td>
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<tr>
<td></td>
<td>DS 3000</td>
<td>4</td>
<td>CS 1210</td>
<td>1</td>
<td>Elective</td>
<td>4</td>
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<tr>
<td></td>
<td>ENVR skills course</td>
<td>4</td>
<td>DS 4200</td>
<td>4</td>
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<tr>
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<td>ENVR Earth oceans course</td>
<td>4</td>
<td>DS 4300</td>
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<th>Spring</th>
<th>Hours</th>
<th>Summer 1</th>
<th>Hours</th>
<th>Summer 2</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Co-op</td>
<td></td>
<td>DS 4400</td>
<td>4</td>
<td>ENGW 3302</td>
<td>4</td>
<td>Co-op</td>
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</tr>
<tr>
<td></td>
<td>ENVR conservation course</td>
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<td>Elective</td>
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<td>ENVR sustainable course</td>
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</tr>
<tr>
<td></td>
<td>ENVR society course</td>
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<table>
<thead>
<tr>
<th>Year 4</th>
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<th>Hours</th>
<th>Spring</th>
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<tbody>
<tr>
<td></td>
<td>Co-op</td>
<td></td>
<td>DS 4420</td>
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<td>Integrative course</td>
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<td>Khoury elective</td>
<td>4</td>
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**Total Hours:** 141