The data science and linguistics combined major provides students with extensive background in the formal structures of natural (human) languages and in the collection, manipulation, storage, retrieval, and computational analysis of data in its various forms. The program teaches the methods and applications of linguistic and psycholinguistic analyses of human language data combined with skills in big data analysis, data science, and data analytics. The major provides excellent preparation for work or more advanced degrees focusing on computational linguistics, natural language processing, machine learning, and a wide array of related fields.

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td></td>
<td><strong>Computer Science Overview</strong></td>
<td></td>
</tr>
<tr>
<td>CS 1200</td>
<td>First Year Seminar</td>
<td>1</td>
</tr>
<tr>
<td>or LING 1000</td>
<td>Linguistics at Northeastern</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>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Programming Sequence Pathways</strong></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td><strong>Computer Science Option</strong></td>
<td></td>
</tr>
<tr>
<td>CS 2500</td>
<td>Fundamentals of Computer Science 1</td>
<td></td>
</tr>
<tr>
<td>and CS 2501</td>
<td>and Lab for CS 2500</td>
<td></td>
</tr>
<tr>
<td>CS 2510</td>
<td>Fundamentals of Computer Science 2</td>
<td></td>
</tr>
<tr>
<td>and CS 2511</td>
<td>and Lab for CS 2510</td>
<td></td>
</tr>
<tr>
<td>CS 3500</td>
<td>Object-Oriented Design</td>
<td></td>
</tr>
<tr>
<td>and CS 3501</td>
<td>and Lab for CS 3500</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Data Science Option</strong></td>
<td></td>
</tr>
<tr>
<td>DS 2000</td>
<td>Programming with Data</td>
<td></td>
</tr>
<tr>
<td>and DS 2001</td>
<td>and Data Science Programming Practicum</td>
<td></td>
</tr>
<tr>
<td>DS 2500</td>
<td>Intermediate Programming with Data</td>
<td></td>
</tr>
<tr>
<td>and DS 2501</td>
<td>and Lab for DS 2500</td>
<td></td>
</tr>
<tr>
<td>DS 3500</td>
<td>Advanced Programming with Data</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Computer Science Required Courses</strong></td>
<td></td>
</tr>
<tr>
<td>CS 1800</td>
<td>Discrete Structures</td>
<td>5</td>
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<tr>
<td>and CS 1802</td>
<td>and Seminar for CS 1800</td>
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<tr>
<td>CS 3200</td>
<td>Database Design</td>
<td>4</td>
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<tr>
<td></td>
<td><strong>Data Science Foundations</strong></td>
<td></td>
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<tr>
<td>DS 3000</td>
<td>Foundations of Data Science</td>
<td>4</td>
</tr>
<tr>
<td>DS 4200</td>
<td>Information Presentation and Visualization</td>
<td>4</td>
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<tr>
<td>DS 4300</td>
<td>Large-Scale Information Storage and Retrieval</td>
<td>4</td>
</tr>
<tr>
<td>DS 4400</td>
<td>Machine Learning and Data Mining 1</td>
<td>4</td>
</tr>
<tr>
<td>DS 4420</td>
<td>Machine Learning and Data Mining 2</td>
<td>4</td>
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<tr>
<td></td>
<td><strong>Khoury Elective Course</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>With adviser approval, directed study, research, project study, and appropriate graduate-level courses may also be taken as upper-division electives.</td>
<td></td>
</tr>
</tbody>
</table>
Data Science and Linguistics, BS

Complete four semester hours of CS, CY, DS, or IS classes that are not already required. Choose courses within the following ranges:
- 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

**Linguistics Requirements**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LING 1150</td>
<td>Introduction to Language and Linguistics</td>
<td>4</td>
</tr>
<tr>
<td>LING 2350</td>
<td>Linguistic Analysis</td>
<td>4</td>
</tr>
<tr>
<td>LING 3412</td>
<td>Language and Culture</td>
<td>4</td>
</tr>
</tbody>
</table>

**Linguistic Structure**

Complete four of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LING 3420</td>
<td>Phonetics</td>
<td></td>
</tr>
<tr>
<td>LING 3422</td>
<td>Phonology</td>
<td></td>
</tr>
<tr>
<td>LING 3424</td>
<td>Morphology</td>
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</tr>
<tr>
<td>LING 3450</td>
<td>Syntax</td>
<td></td>
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<tr>
<td>LING 3452</td>
<td>Semantics</td>
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**Laboratory/Directed Study**

Complete one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LING 4891</td>
<td>Research Seminar in Linguistics</td>
<td>4</td>
</tr>
<tr>
<td>LING 4991</td>
<td>Directed Study Research</td>
<td></td>
</tr>
<tr>
<td>PSYC 4610</td>
<td>Laboratory in Psycholinguistics</td>
<td></td>
</tr>
</tbody>
</table>

**Seminar Requirement**

LING 4654 | Seminar in Linguistics | 4
or PSYC 4658 | Seminar in Psycholinguistics | 

**Linguistics Electives**

Complete three courses not used to fulfill other degree requirements from the following options:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEAF 2700</td>
<td>ASL Linguistics</td>
<td>4</td>
</tr>
<tr>
<td>LING 3000 to LING 4999</td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

---

Please visit the Linguistics Courses page (https://catalog.northeastern.edu/undergraduate/science/linguistics/#coursestext) within this catalog to review the list of courses in the LING 3000 - LING 4999 range.

**Supporting Courses**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 1341</td>
<td>Calculus 1 for Science and Engineering</td>
<td>4</td>
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</table>

**Integrative Requirement**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CS 4120</td>
<td>Natural Language Processing</td>
<td>4</td>
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</table>

**Data Science Writing Requirement**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>ENGW 1111</td>
<td>First-Year Writing</td>
<td>4</td>
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</tbody>
</table>

**Advanced Writing in the Disciplines**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGW 3302</td>
<td>Advanced Writing in the Technical Professions</td>
<td>4</td>
</tr>
<tr>
<td>or ENGW 3307</td>
<td>Advanced Writing in the Sciences</td>
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</tr>
<tr>
<td>or ENGW 3315</td>
<td>Interdisciplinary Advanced Writing in the Disciplines</td>
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</table>
**Required General Electives**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Complete 20 semester hours of general electives.</td>
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<td>20</td>
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</tbody>
</table>

**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
- Interpreting Culture
- Conducting Formal and Quantitative Reasoning
- Understanding Societies and Institutions
- Analyzing and Using Data
- Engaging Differences and Diversity
- 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**

130 total semester hours required

**Plan of Study**

**Sample Plan of Study:**

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

**Year 1**

<table>
<thead>
<tr>
<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>CS 1200</td>
<td>1</td>
<td>DS 2500 and DS 2501</td>
<td>5</td>
<td>LING Elective</td>
<td>4</td>
<td>Elective</td>
<td>4</td>
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<tr>
<td>CS 1800 and CS 1802</td>
<td>5</td>
<td>LING 2350</td>
<td>4</td>
<td>Elective</td>
<td>4</td>
<td>Elective</td>
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<tr>
<td>DS 2000 and DS 2001</td>
<td>4</td>
<td>MATH 1341</td>
<td>4</td>
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<tr>
<td>ENGW 1111</td>
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<td>LING Elective</td>
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<td>LING 1150</td>
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**Year 2**

<table>
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<tr>
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<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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<tbody>
<tr>
<td>CS 3200</td>
<td>4</td>
<td>CS 1210</td>
<td>1</td>
<td>Khoury Elective</td>
<td>4</td>
<td>Co-op</td>
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</tr>
<tr>
<td>DS 3000</td>
<td>4</td>
<td>DS 3500</td>
<td>4</td>
<td>Elective</td>
<td>4</td>
<td></td>
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<tr>
<td>LING 3412</td>
<td>4</td>
<td>DS 4200</td>
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<tr>
<td>LING Structure</td>
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<tr>
<td>LING Elective</td>
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**Year 3**

<table>
<thead>
<tr>
<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>Co-op</td>
<td></td>
<td>CS 4120</td>
<td>4</td>
<td>ENGW 3302</td>
<td>4</td>
<td>Co-op</td>
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<td>DS 4300</td>
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<td>Elective</td>
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<tr>
<td>DS 4400</td>
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<td>LING Structure</td>
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</tbody>
</table>

**Integrating Knowledge and Skills Through Experience** is satisfied through co-op.
<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-op</td>
<td></td>
<td>DS 4420</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LING Lab (or directed study)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LING Seminar</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LING Structure</td>
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Total Hours: 132