The Bachelor of Science in Data Science studies 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 [Link to 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 [Link to NUpath](http://catalog.northeastern.edu/undergraduate/university-academics/nupath).

Data Science Major Requirements

### Computer Science Overview
- **CS 1200** Computer Science/Information Science 1
- **CS 1210** Computer Science/Information Science 2: Co-op Preparation

### Computer Science Foundation Courses
A grade of C– or higher is required in CS 2500, CS 2510, and CS 1800:
- CS 1800 Discrete Structures and Seminar for CS 1800 5
- or CS 1801 Recitation for CS 1800 1
- CS 2500 Fundamentals of Computer Science 1 and Lab for CS 2500 5
- or CS 2501 Fundamentals of Computer Science 1 and Lab for CS 2501 5
- CS 2510 Fundamentals of Computer Science 2 and Lab for CS 2510 5
- CS 3500 Object-Oriented Design 4
- CS 3520 Programming in C++ 4
- THTR 1170 The Eloquent Presenter 1

### Information Science Foundations
- **IS 2000** Principles of Information Science 4
- **CS 3200** Database Design 4

### Mathematics and Statistics Foundations
- **MATH 1341** Calculus 1 for Science and Engineering 4
- **MATH 1342** Calculus 2 for Science and Engineering 4

Complete one of the following:
- **ECON 2350** Statistics 4
- **ENVR 2500** Biostatistics 4
- **MATH 3081** Probability and Statistics 4
- **PSYC 2320** Statistics in Psychological Research 4

### Data Science Foundations
- **DS 4100** Data Collection, Integration, and Analysis 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
- **DS 4900** Data Science Senior Project 4

### Data-Science-Related Electives
Complete six courses from the categories A and B, at least three of which must be from Category B.

#### Category A: Data-Science-Related Electives in Computer and Information Science
- **IS 3500** Information System Design and Development 4
- **IS 4200** or **IS 6200** Information Retrieval 4
- **IS 4300** Human Computer Interaction 4
- **IS 4700** Social Information Systems 4
- or **CS 5750** Social Computing 4
- **IS 4800** Empirical Research Methods 4
- or **IS 6350** Empirical Research Methods 4
- **CS 3740** Systems Security 4
- **CS 4100** Artificial Intelligence 4
- or **CS 5100** Foundations of Artificial Intelligence 4

#### Category B: Data-Science-Related Electives in Other Units
- **ARTG 3451** Information Design 1 4
- **ARTG 4552** Information Design 2 4
- **ARTG 4550** Information Design Studio 1: Principles 4
- **ARTG 5110** Information Design History 4
- **ARTG 5120** Information Design Research Methods 4
- **ARTG 5330** Visualizations Technologies 4
- **ARTG 6100** Information Design Studio 2: Dynamic Mapping and Models 4
- **ARTG 6200** Information Design Studio 3: Synthesis 4
- **BINF 6308** Bioinformatics Computational Methods 4
BINF 6309  Bioinformatics Computational Methods  
EECE 4542  Advanced Engineering Algorithms  
EECE 5639  Computer Vision  
EECE 5642  Data Visualization  
EECE 5644  Introduction to Machine Learning and Pattern Recognition  
FINA 4608  Advanced Financial Strategy  
GSND 5110  Game Design and Analysis  
GSND 6350  Game Analytics  
HINF 5101  Introduction to Health Informatics and Health Information Systems  
HINF 5102  Data Management in Healthcare  
HINF 5300  Personal Health Interface Design and Development  
HINF 5301  Personal Health Technologies: Field Deployment and System Evaluation  
IA 5010  Foundations of Information Assurance  
IA 5050  Data Mining in Cyberspace  
IA 5200  Security Risk Management and Assessment  
IE 4615  Expert Systems and Neural Networks  
IE 5640  Data Mining for Engineering Applications  
ECON 2350  Statistics  
ENVR 2500  Biostatistics  
MATH 2331  Linear Algebra  
MATH 3081  Probability and Statistics  
MATH 4581  Statistics and Stochastic Processes  
MISM 3305  Information Resource Management  
MISM 3403  Data Management in the Enterprise  
MKTG 3401  Marketing Research  
MKTG 3501  Marketing Analytics  
PSYC 2320  Statistics in Psychological Research

1 The statistics course options under Mathematics and Statistics Foundations are also listed here as Data-Science-Related Electives. A student is permitted to take at most one additional statistics course to see statistics from the perspective of a different department.

Computer Science Writing Requirement
College Writing
ENGW 1111  First-Year Writing  
Advanced Writing in the Disciplines
ENGW 3302  Advanced Writing in the Technical Professions  
or ENGW 3315  Interdisciplinary Advanced Writing in the Disciplines

Required General Electives
Complete eight general electives.

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

NUpath Requirements Satisfied
- 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
133 total semester hours required

Plan of Study
Sample Patterns:
Four Years, Two Co-ops

Year 1
Fall Hours  Spring Hours  Summer 1 Hours  Summer 2 Hours  
CS 1200  1  CS 2510  5  CS 3200  4  
and CS 2511  
CS 1800  5  IS 2000  4  CS 3500  4  
and CS 1802  
CS 2500  5  MATH 1342  4  
and CS 2501  
ENGW 1111  4  Elective  4  
MATH 1341  4  

Year 2
Fall Hours  Spring Hours  Summer 1 Hours  Summer 2 Hours  
CS 3520  4  DS 4200  4  ENGW 3302  4  Co-op  
DS 4100  4  DS 4300  4  Elective  4  
Statistics course  
Elective  4  Elective  4  
Elective  4  

Year 3
Fall Hours  Spring Hours  Summer 1 Hours  Summer 2 Hours  
Co-op  
DS 4400  4  Co-op  
Co-op  
Data science elective  4  
Data science elective  4  
Elective  4  
THTR 1170  1  

Year 4
Fall Hours  Spring Hours  
Data science elective  4  DS 4420  4  
Data science elective  4  DS 4900  4  
Data science elective  4  Data science elective  4
<table>
<thead>
<tr>
<th>Course</th>
<th>Fall Hours</th>
<th>Spring Hours</th>
<th>Summer 1 Hours</th>
<th>Summer 2 Hours</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1200</td>
<td>1</td>
<td>CS 2510</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and CS 2511</td>
<td></td>
<td></td>
<td>Vacation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 1800</td>
<td>5</td>
<td>IS 2000</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>and CS 1802</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 2500</td>
<td>5</td>
<td>MATH 1342</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>and CS 2501</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 1341</td>
<td>4</td>
<td>Elective</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ENGW 1111</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>17</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Year 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 3200</td>
<td>4</td>
<td>CS 1210</td>
<td>1</td>
<td>Vacation</td>
<td>Co-op</td>
</tr>
<tr>
<td>CS 3500</td>
<td>4</td>
<td>CS 3520</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>DS 4100</td>
<td>4</td>
<td>DS 4200</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Statistics</td>
<td>4</td>
<td>DS 4300</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Elective</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>17</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Year 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-op</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DS 4400</td>
<td>4</td>
<td>ENGW 3302</td>
<td>4</td>
<td>4</td>
<td>Co-op</td>
</tr>
<tr>
<td>DS-related</td>
<td>4</td>
<td>Elective</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>elective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DS-related</td>
<td>4</td>
<td>Elective</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>elective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>THTR 1170</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>17</td>
<td>8</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Year 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-op</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DS 4420</td>
<td>4</td>
<td>Elective</td>
<td></td>
<td>4</td>
<td>Co-op</td>
</tr>
<tr>
<td>DS-related</td>
<td>4</td>
<td>Elective</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>elective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DS-related</td>
<td>4</td>
<td>Elective</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>elective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>16</td>
<td>8</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Year 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-op</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DS 4900</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DS-related</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>elective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DS-related</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>elective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Hours: 134