# Data Science and Chemistry, BS

The data science and chemistry major combines chemistry, information science, and mathematics to give students both breadth and depth in chemistry and data science fundamentals. During their course of study, students have an opportunity to develop qualitative and quantitative problem-solving skills as well as effective communication skills. Students will study the collection, manipulation, storage, retrieval, and computational analysis of chemical and other scientific data in its various forms, including numeric, textual, image, and video data from small to large volumes. The program engages students in rigorous coursework designed to prepare students to interpret the ever-expanding knowledge base.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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 Requirements

| Code | Title | Hours |
|---|---|---|
| **Computer Science Overview** | | |
| Must be taken in alignment with your home college: | | |
| CS 1200 | First Year Seminar | 1 |
| or CHEM 1000 | Chemistry/Chemical Biology at Northeastern | |
| or INSC 1000 | Science at Northeastern | |
| CS 1210 | Professional Development for Khoury Co-op | 1 |
| or EESC 2000 | Professional Development for Co-op | |
| **Programming Sequence Pathways** | | |
| Choose one of the two options: | | 12 |
| *Computer Science Option* | | |
| CS 2500<br>and CS 2501 | Fundamentals of Computer Science 1<br>and Lab for CS 2500 | |
| CS 2510<br>and CS 2511 | Fundamentals of Computer Science 2<br>and Lab for CS 2510 | |
| CS 3500<br>and CS 3501 | Object-Oriented Design<br>and Lab for CS 3500 | |
| *Data Science Option* | | |
| DS 2000<br>and DS 2001 | Programming with Data<br>and Data Science Programming Practicum | |
| DS 2500<br>and DS 2501 | Intermediate Programming with Data<br>and Lab for DS 2500 | |
| DS 3500 | Advanced Programming with Data | |
| **Computer Science Required Courses** | | |
| CS 1800<br>and CS 1802 | Discrete Structures<br>and Seminar for CS 1800 | 5 |
| CS 3200 | Introduction to Databases | 4 |

| | | |
|---|---|---|
| **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 |
| **Khoury Elective** | | |
| 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 of CS, CY, DS, or IS classes that are not already required. Choose courses within the following ranges: | | 4 |
| 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 | | |
| **Statistics Foundations** | | |
| ENVR 2500<br>and ENVR 2501 | Biostatistics<br>and Lab for ENVR 2500 | 5 |

## Chemistry Requirements

| Code | Title | Hours |
|---|---|---|
| **General Chemistry** | | |
| CHEM 1161<br>and CHEM 1162<br>and CHEM 1163 | General Chemistry for Science Majors<br>and Lab for CHEM 1161<br>and Recitation for CHEM 1161 | 5 |
| CHEM 2161<br>and CHEM 2162<br>and CHEM 2163 | Concepts in Chemistry<br>and Lab for CHEM 2161<br>and Recitation for CHEM 2161 | 5 |
| **Organic Chemistry** | | |
| Complete one of the following: | | 5 |
| CHEM 2311<br>and CHEM 2312 | Organic Chemistry 1<br>and Lab for CHEM 2311 | |
| CHEM 2315<br>and CHEM 2316 | Organic Chemistry 1 for Chemistry Majors<br>and Lab for CHEM 2315 | |
| Complete one of the following: | | 5 |
| CHEM 2313<br>and CHEM 2314 | Organic Chemistry 2<br>and Lab for CHEM 2313 | |
| CHEM 2317<br>and CHEM 2318 | Organic Chemistry 2 for Chemistry Majors<br>and Lab for CHEM 2317 | |
| **Analytical Chemistry** | | |
| CHEM 2321<br>and CHEM 2322<br>and CHEM 2323 | Analytical Chemistry<br>and Lab for CHEM 2321<br>and Recitation for CHEM 2321 | 5 |
| **Advanced-Level Chemistry** | | |
| Complete one course from the following options: | | 4 |
| CHEM 3410 | Environmental Geochemistry | |
| CHEM 3501 to CHEM 4628 | | |
| **Mathematics Foundations** | | |
| MATH 1341 | Calculus 1 for Science and Engineering | 4 |
| MATH 1342 | Calculus 2 for Science and Engineering | 4 |
| **Supporting Course** | | |
| PHYS 1151<br>and PHYS 1152<br>and PHYS 1153 | Physics for Engineering 1<br>and Lab for PHYS 1151<br>and Interactive Learning Seminar for PHYS 1151 | 5 |

## Integrative Requirements

| Code | Title | Hours |
|---|---|---|
| **Integrative Courses** | | |
| CHEM 3401<br>and CHEM 3402 | Chemical Thermodynamics and Kinetics<br>and Lab for CHEM 3401 | 5 |
| CHEM 4750 | Senior Research | 4 |

## Writing Requirements

| 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 | |

## Required General Electives

| Code | Title | Hours |
|---|---|---|
| Complete 24 semester hours of general electives. | | 24 |

## Khoury College GPA Requirement

Minimum cumulative 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

130 total semester hours required

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

**Year 1**

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|---|---|---|---|---|---|---|---|
| CHEM 1161<br>and CHEM 1162<br>and CHEM 1163 | 5 | CHEM 2161<br>and CHEM 2162<br>and CHEM 2163 | 5 | General elective | 4 | Vacation | |
| CS 1200, CHEM 1000, or INSC 1000 | 1 | DS 2500<br>and DS 2501 | 5 | General elective | 4 | | |
| CS 1800<br>and CS 1802 | 5 | MATH 1341 | 4 | | | | |
| DS 2000<br>and DS 2001 | 4 | General elective | 4 | | | | |
| ENGW 1111 | 4 | | | | | | |
| | **19** | | **18** | | **8** | | **0** |

**Year 2**

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|---|---|---|---|---|---|---|---|
| CHEM 2311<br>and CHEM 2312 | 5 | CHEM 2313<br>and CHEM 2314 | 5 | General elective | 4 | Co-op | |
| CS 3200 | 4 | CS 1210 or EESC 2000 | 1 | General elective | 4 | | |
| DS 3000 | 4 | DS 3500 | 4 | | | | |
| MATH 1342 | 4 | DS 4200 | 4 | | | | |
| | | ENVR 2500<br>and ENVR 2501 | 5 | | | | |
| | **17** | | **19** | | **8** | | **0** |

**Year 3**

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|---|---|---|---|---|---|---|---|
| Co-op | | CHEM 2321<br>and CHEM 2322<br>and CHEM 2323 | 5 | ENGW 3302, 3307, or 3315 | 4 | Co-op | |
| | | DS 4300 | 4 | Khoury Elective | 4 | | |
| | | DS 4400 | 4 | | | | |
| | | PHYS 1151<br>and PHYS 1152<br>and PHYS 1153 | 5 | | | | |
| | **0** | | **18** | | **8** | | **0** |

**Year 4**

| Fall | Hours | Spring | Hours |
|---|---|---|---|
| Co-op | | CHEM 4750 | 4 |
| | | CHEM 3401<br>and CHEM 3402 | 5 |
| | | Advanced Level Chemistry | 4 |
| | | General elective | 4 |
| | **0** | | **17** |

**Total Hours: 132**