

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

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 Requirements

Code	Title	Hours
Computer Science Overview		
CS 1200 or CHEM 1000 or INSC 1000	First Year Seminar Chemistry/Chemical Biology at Northeastern Science at Northeastern	1
CS 1210 or EESC 2000	Professional Development for Khoury Co-op Professional Development for Co-op	1
Programming Sequence Pathways		
Choose one of the two options:		12
<i>Computer Science Option</i>		
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 and CS 3501	Object-Oriented Design and Lab for CS 3500	
<i>Data Science Option</i>		
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
CS 3200	Database Design	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 credits of CS, CY, DS, or IS classes that are not already required. Choose courses within the following ranges:		4

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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 and ENVR 2501	Biostatistics and Lab for ENVR 2500	5
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Chemistry Requirements

Code	Title	Hours
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General Chemistry

Choose one pair of courses: 10

CHEM 1211
and CHEM 1212 General Chemistry 1
and Lab for CHEM 1211

CHEM 1214
and CHEM 1215 General Chemistry 2
and Lab for CHEM 1214

OR

CHEM 1161
and CHEM 1162
and CHEM 1163 General Chemistry for Science Majors
and Lab for CHEM 1161
and Recitation for CHEM 1161

CHEM 2161
and CHEM 2162
and CHEM 2163 Concepts in Chemistry
and Lab for CHEM 2161
and Recitation for CHEM 2161

Intermediate-Level Chemistry

CHEM 2311
and CHEM 2312 Organic Chemistry 1
and Lab for CHEM 2311 5

CHEM 2313
and CHEM 2314 Organic Chemistry 2
and Lab for CHEM 2313 5

CHEM 2321
and CHEM 2322
and CHEM 2323 Analytical Chemistry
and Lab for CHEM 2321
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
and PHYS 1152
and PHYS 1153 Physics for Engineering 1
and Lab for PHYS 1151
and Interactive Learning Seminar for PHYS 1151 5

Integrative Requirements

Code	Title	Hours
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Integrative Course

CHEM 3431
and CHEM 3432 Physical Chemistry
and Lab for CHEM 3431 5

CHEM 4750 Senior Research 4

Writing Requirements

Code	Title	Hours
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College Writing

ENGW 1111
or ENGW 1102 First-Year Writing
First-Year Writing for Multilingual Writers 4

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 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

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 1211 and CHEM 1212		5 CHEM 1214 and CHEM 1215		5 CS 3500 and CS 3501		5 Vacation	
CS 1200		1 CS 2510 and CS 2511		5 General elective		4	
CS 1800 and CS 1802		5 MATH 1341		4			
CS 2500 and CS 2501		5 General elective		4			
ENGW 1111		4					
		20		18		9	0
Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 2311 and CHEM 2312		5 CHEM 2313 and CHEM 2314		5 General elective		4 Co-op	
CS 3200		4 CHEM 2321 and CHEM 2322 and CHEM 2323		5 General elective		4	
DS 3000		4 CS 1210		1			
MATH 1342		4 DS 4200		4			
		General elective		4			
		17		19		8	0
Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		DS 4300		4 CHEM 3431 and CHEM 3432		5 Co-op	
		DS 4400		4 ENGW 3302		4	

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		ENVR 2500 and ENVR 2501	5		
		PHYS 1151 and PHYS 1152 and PHYS 1153	5		
	0		18	9	0
Year 4					
Fall	Hours	Spring	Hours		
Co-op		CHEM 4750	4		
		Chemistry advanced elective	4		
		Khoury elective	4		
		General elective	4		
	0		16		

Total Hours: 134