

Data Science and Biology, BS

The data science and biology major provides a strong foundation in biology, chemistry, and mathematics, as well as software development and algorithms. 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. Students also explore the organization and processes of life across broad areas of the field, from molecules and cells through organs and organ systems to populations, ecosystems, and evolution.

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 BIOL 1000 or INSC 1000	First Year Seminar 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 adviser approval, directed study, research, project study, and appropriate graduate-level courses may also be taken as upper-division electives.		
Complete four semester hours 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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Computer Science 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
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Advanced Writing in the Disciplines

ENGW 3302 or ENGW 3315 or ENGW 3307	Advanced Writing in the Technical Professions Interdisciplinary Advanced Writing in the Disciplines Advanced Writing in the Sciences	4
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Biology Requirements

Code	Title	Hours
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Biology Foundations

BIOL 1107 and BIOL 1108	Foundations of Biology and Lab for BIOL 1107	5
BIOL 2299	Inquiries in Biological Sciences	4
BIOL 2301 and BIOL 2302	Genetics and Molecular Biology and Lab for BIOL 2301	5
BIOL 2309	Biology Project Lab	4
BIOL 3611 and BIOL 3612	Biochemistry and Lab for BIOL 3611	5

Chemistry Foundations

CHEM 1161 and CHEM 1162	General Chemistry for Science Majors and Lab for CHEM 1161	5
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

Intermediate and Advanced Biology Elective

Complete one of the following:		4
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BIOL 2327 to BIOL 3999

BIOL 4705 to BIOL 5999

EEMB 2290 to EEMB 5515

EEMB 5520 to EEMB5534

EEMB 5548 to EEMB 5569

ENVR 5242 Ancient Marine Life

Research:

BIOL 4991 Research

BIOL 4970 Junior/Senior Honors Project 1

BIOL 4971 Junior/Senior Honors Project 2

BIOL 4994 Internship

Organismal and Evolutionary Biology Elective

Complete one course and its corresponding lab, if indicated:		4-5
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BIOL 2327 Human Parasitology

BIOL 3401 Comparative Vertebrate Anatomy

BIOL 3403 Animal Behavior

BIOL 3413 Current Topics in Organismal and Population Biology

EEMB 2302 and EEMB 2303	Ecology and Lab for EEMB 2302	
EEMB 2400	Introduction to Evolution	
EEMB 2700 and EEMB 2701	Marine Biology and Lab for EEMB 2700	
EEMB 3460	Conservation Biology	
EEMB 3466	Disease Ecology	

Physics Requirement

Complete one of the following lecture/lab pairs. PHYS 1145/PHYS 1146 is recommended: 5

PHYS 1145 and PHYS 1146	Physics for Life Sciences 1 and Lab for PHYS 1145	
PHYS 1151 and PHYS 1152	Physics for Engineering 1 and Lab for PHYS 1151	
PHYS 1161 and PHYS 1162	Physics 1 and Lab for PHYS 1161	

Mathematics Foundations

MATH 1251	Calculus and Differential Equations for Biology 1	4
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Integrative Requirements

Code	Title	Hours
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Integrative Course

Complete one of the following: 4

BIOL 5569	Advanced Microbiology	
BINF 6308	Bioinformatics Computational Methods 1	
BIOL 4707	Cell and Molecular Biology	
BIOL 5581	Biological Imaging	
BIOL 5587	Comparative Neurobiology	
BIOL 5591	Advanced Genomics	

Capstone

Choose one: 4

BIOL 4701	Biology Capstone	
BIOL 4900	Biology Research Capstone	
BIOL 4971	Junior/Senior Honors Project 2	

Required General Electives

Code	Title	Hours
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Complete 20 semester hours of general electives. 20

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
- Exploring Creative Expression and Innovation
- 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

138 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
CS 1200		1 CS 2510 and CS 2511		5 CS 3500		4 BIOL 2301 and BIOL 2302	5
CS 1800 and CS 1802		5 BIOL 2299		4 General Elective		4 General Elective	4
CS 2500 and CS 2501		5 MATH 1251		4			
BIOL 1107 and BIOL 1108		5 CHEM 1161 and CHEM 1162		5			
ENGW 1111		4					
		20		18		8	9
Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
DS 3000		4 CS 1210		1 BIOL 3611 and BIOL 3612		5 Co-op	
PHYS 1145 and PHYS 1146		5 DS 4200		4 General Elective		4	
CHEM 2311 and CHEM 2312		5 CHEM 2313 and CHEM 2314		5			
ENVR 2500 and ENVR 2501		5 CS 3200		4			
		BIOL 2309		4			
		19		18		9	0
Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		DS 4300		4 ENGW 3302		4 Co-op	
		General Elective		4 General Elective		4	
		Khoury Elective		4			
		Organismal and Population BIOL Elective		4			
		0		16		8	0
Year 4							
Fall	Hours	Spring	Hours				
Co-op		BIOL 4701		4			
		DS 4400		4			
		Integrative course		4			
		BIOL Intermediate/ Advanced Science		4			
		0		16			

Total Hours: 141