Data Science and Ecology and Evolutionary Biology, BS (Boston)

The combined major in data science and ecology and evolutionary biology provides a strong foundation in the fundamentals of ecology and evolutionary biology, including focal points in population, community, and ecosystem ecology; evolutionary ecology and biology; conservation biology; population genetics; behavior; and ecological and evolutionary genomics. Data science allows students to 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. The interdisciplinary nature of the major fosters critical thinking and creativity in scientific problem solving.

Students majoring in ecology and evolutionary biology and associated combined majors cannot combine majors in biology, marine biology, or environmental and sustainability sciences, nor can they minor in biology, marine science, or environmental and sustainability sciences.

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 Coursework

Code	Title	Hours
Computer Science Overview		
Must be taken in alignment with your home college.		
CS 1200	First Year Seminar	1
or ENVR 1000	Marine and Environmental Sciences 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	
Computer Science Required Courses		
All students can take a self-assessment to attempt to place out of CS 2000 and CS 2001. Students who place out of CS 2000 and CS 2001 will instead substitute 4-5 semester hours of CS, CY, or DS coursework at the 3000 level or higher not otherwise required in the degree.		
CS 1800 and CS 1802	Discrete Structures and Seminar for CS 1800	5
CS 2000 and CS 2001	Introduction to Program Design and Implementation and Lab for CS 2000	5
CS 3200	Introduction to Databases	4
Programming Sequence Pathways		
Complete one of the two options:		9
Computer Science Option		
CS 2100 and CS 2101	Program Design and Implementation 1 and Lab for CS 2100	
CS 3100 and CS 3101	Program Design and Implementation 2 and Lab for CS 3100	
Data Science Option		
DS 2500 and DS 2501	Intermediate Programming with Data and Lab for DS 2500	
DS 3500	Advanced Programming with Data	
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 Approved Electives		
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 from within the following options:		4
CS 2500 or higher, except CS 5010		
CY 2000 or higher, except CY 4930		
DS 2500 or higher, except DS 4900		
MKTG 4606	Digital, Analytics, Technology, and Automation Research Practicum	

Ecology and Evolutionary Biology Coursework

Code	Title	Hours
Ecology and Evolutionary Biology		
EEMB 1101 and EEMB 1102	Foundations in Ecology and Evolutionary Biology and Lab for EEMB 1101	5
Ecology and Evolutionary Genomics		
EEMB 1105 and EEMB 1106	Foundations in Ecological and Evolutionary Genomics and Lab for EEMB 1105	5
Genetics		
BIOL 2301 and BIOL 2302	Genetics and Molecular Biology and Lab for BIOL 2301	5
Evolution		
EEMB 2400	Introduction to Evolution	4
Ecology		
EEMB 2302 and EEMB 2303	Ecology and Lab for EEMB 2302	5
Capstone		
ENVR 4997	Senior Thesis	4

Ecology and Evolutionary Biology Topical Requirement

Code	Title	Hours
Complete 16 semester hours of the following (at least one course must be taken from each list):		16
Evolution of Organisms		
EEMB 2700 and EEMB 2701	Marine Biology and Lab for EEMB 2700	
EEMB 3600	Animal Behavior	
EEMB 3700	Desert Ecology	
Ecology and Conservation Biology		
EEMB 3460	Conservation Biology	
EEMB 3465	Ecological and Conservation Genomics	
EEMB 3475	Wildlife Ecology	
EEMB 4001	Landscape and Restoration Ecology	
ENVR 3125	Global Oceanic Change	
ENVR 3150	Food Security and Sustainability	
ENVR 4505	Wetlands	
ENVR 5700	Streams and Watershed Ecology	
ENVR 5750	Urban Ecology	
Analytical Skills		
EEMB 3465	Ecological and Conservation Genomics	
EEMB 5130	Population Dynamics	
ENVR 3300 and ENVR 3301	Geographic Information Systems and Lab for ENVR 3300	
ENVR 5500	Advanced Biostatistics	
ENVR 5563	Advanced Spatial Analysis	

Supporting Courses

Code	Title	Hours
Calculus		
ENVR 2500 and ENVR 2501	Biostatistics and Lab for ENVR 2500	5
MATH 1251	Calculus and Differential Equations for Biology 1	4
or MATH 1341	Calculus 1 for Science and Engineering	
Chemistry		
CHEM 1161 and CHEM 1162 and CHEM 1163	General Chemistry for Science Majors and Lab for CHEM 1161 and Recitation for CHEM 1161	5
Physics		
Complete one of the following:		5
PHYS 1145 and PHYS 1146	Physics for Life Sciences 1 and Lab for PHYS 1145	
PHYS 1151 and PHYS 1152 and PHYS 1153	Physics for Engineering 1 and Lab for PHYS 1151 and Interactive Learning Seminar for PHYS 1151	
PHYS 1161 and PHYS 1162	Physics 1 and Lab for PHYS 1161	

Computer Science Writing Requirement

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 3303	Advanced Writing in the Environmental Professions	
ENGW 3307	Advanced Writing in the Sciences	
ENGW 3315	Interdisciplinary Advanced Writing in the Disciplines	

Integrative Requirement

Code	Title	Hours
Integrative Course		
DS 4420	Machine Learning and Data Mining 2	4

Required General Electives

Code	Title	Hours
Complete 16 semester hours of general electives.		16

Khoury College GPA Requirement

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

Science GPA Requirement (Ecology and Evolutionary Biology)

A minimum 2.000 GPA in the following course codes is required: EEMB, ENVR

NUpath Requirements Satisfied

- Advanced Writing in the Disciplines
- Analyzing and Using Data
- Conducting Formal and Quantitative Reasoning
- Demonstrating Thought and Action in a Capstone
- Engaging with the Natural and Designed World
- Writing in the First Year
- Writing-Intensive in the Major

Integrating Knowledge and Skills Through Experience is satisfied through co-op.

Program Requirement

133 total semester hours required

Plan of Study

Sample Plan of Study

FOUR YEARS, TWO CO-OPS IN SUMMER SECOND HALF/FALL

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1200, ENVR 1000, or INSC 1000	1	DS 2500 and DS 2501	5	BIOL 2301 and BIOL 2302	5	General Elective	4
CS 1800 and CS 1802	5	EEMB 1105 and EEMB 1106	5	General Elective	4	General Elective	4
CS 2000 and CS 2001	5	ENVR 2500 and ENVR 2501	5				
EEMB 1101 and EEMB 1102	5	MATH 1251 or 1341	4				
ENGW 1111	4						
	20		**19**		**9**		**8**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1211 and CHEM 1212 and CHEM 1213	5	CS 1210 or EESC 2000	1	General Elective	4	Co-op	0
CS 3200	4	DS 3500	4	Khoury Elective	4		
DS 3000	4	DS 4200	4				
EEB Topical Requirement	4	EEMB 2400	4				
		EEB Topical Requirement	4				
	17		**17**		**8**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	DS 4300	4	ENGW 3302, 3307, or 3315	4	Co-op	0
		DS 4400	4				
		EEMB 2302 and EEMB 2303	5				
		EEB Topical Requirement	4				
	0		**17**		**4**		**0**

Year 4

Fall	Hours	Spring	Hours
Co-op	0	DS 4420	4
		ENVR 4997	4
		EEB Topical Requirement	4
		Physics Requirement	5
	0		**17**

Total Hours: 136