

Data Science and Design, BS

The data science and design combined major integrates a technical degree with a practice-based discipline that poses important questions about—and provides significant answers to—how we live. Students study the collection, manipulation, storage, retrieval, and computational analysis of data in its various forms including numeric, textual, image, and video data. Information designers visualize concepts and data to enhance human understanding of complex and vital knowledge. Their work has an enlightening or instructive intent and is based on factual content.

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 or ARTF 1000	First Year Seminar Art and Design at Northeastern	1
CS 1210 or EEAM 2000	Professional Development for Khoury Co-op Professional Development for Co-op	1
Programming Sequence Pathways		
Complete one of the following 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	Introduction to Databases	4
Data Science Foundations		
DS 3000	Foundations of Data Science	4

DS 4300	Large-Scale Information Storage and Retrieval	4
DS 4400	Machine Learning and Data Mining 1	4

Khoury Elective Courses

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

Design Requirements

Code	Title	Hours
Art + Design Fundamentals Required		
ARTF 1220	Elements of Visual Composition (with optional ARTF 1221)	2
Art + Design Fundamentals Elective		
Complete three of the following:		6
ARTF 1200	Representational Drawing	
ARTF 1210	Abstract Drawing	
ARTF 1230 and ARTF 1231	Making with Form and Materials and Making with Form and Materials Tools	
ARTF 1240 and ARTF 1241	Making with Video, Sound, and Animation and Making with Video, Sound, and Animation Tools	
ARTF 1250 and ARTF 1251	Designing Interactive Experiences and Designing Interactive Experiences Tools	
Design Required		
ARTG 1001 and ARTG 1002	Design Perspectives: An Introduction to Design in the World and Seminar for Design Perspectives	4
ARTG 1270 and ARTG 1271	Design: Process + Practices and Studio for Design: Process + Practices	4
ARTG 1290 and ARTG 1291	Typographic Systems and Studio for Typographic Systems	4
Design Elective		
Complete any one ARTG course, as long as prerequisites have been met and it has not been used to fulfill other requirements of the program.		4
Art + Design History Elective		
Complete any one ARTH course.		4
Art + Design Elective		
Complete any one ARTD, ARTE, ARTG, ARTH, ARTS, or GAME course as long as prerequisites have been met.		4
Degree Capstone Project		
ARTG 4550	Design Degree Project	4

Design Option

Code	Title	Hours
Complete one of the following options. Information Design Option is recommended:		8
Experience Design Option		
ARTG 3462	Experience Design Principles	
ARTG 3464	Topics In Experience Design Inquiry	
Graphic Design Option		
ARTG 2252	Graphic Design Principles	
ARTG 3452	Topics In Graphic Design Inquiry	
Information Design Option		
ARTG 2242	Information Design Principles	
ARTG 3444	Topics in Information Design Inquiry ¹	

Interaction Design Option

ARTG 2400	Interaction Design Principles (with optional ARTG 2401)
ARTG 3400	Topics In Interaction Design Inquiry

¹ Instead of ARTG 3444, ARTG 5100 is recommended for students considering the Plus One in Information Design and Data Visualization.

Integrative Requirements

Code	Title	Hours
ARTG 5330 or ARTG 5150	Visualization Technologies 1: Fundamentals ¹ Information Visualization Principles and Practices	4
DS 4200	Information Presentation and Visualization	4

¹ For students who choose Information Visualization Principles and Practices (ARTG 5150) concurrent registration in Information Design Critique Seminar (ARTG 5151) is recommended. Students are recommended to consult with academic advisor.

Supporting Courses

Code	Title	Hours
Mathematics		
ECON 2350	Statistics for Economists	4
MATH 1341	Calculus 1 for Science and Engineering	4
Computing and Social Issues		
Complete one of the following:		4
AFCS 2600	Issues in Race, Science, and Technology	
CY 4170	The Law, Ethics, and Policy of Data and Digital Technologies	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
HIST 2220	History of Technology	
INSH 2102	Bostonography: The City through Data, Texts, Maps, and Networks	
IS 1300 or PHIL 1300	Knowledge in a Digital World Knowledge in a Digital World	
PHIL 1145	Technology and Human Values	
SOCL 1280	The Twenty-First-Century Workplace	
SOCL 2485	Environment, Technology, and Society	
SOCL 4528	Technology and Society	

Computer Science Writing Requirements

Code	Title	Hours
College Writing		
ENGW 1111	First-Year Writing	4
Advanced Writing in the Disciplines		
ENGW 3302 or ENGW 3314 or ENGW 3315	Advanced Writing in the Technical Professions Advanced Writing in the Arts, Media, and Design Interdisciplinary Advanced Writing in the Disciplines	4

Required General Electives

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

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

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- Writing-Intensive in the Major
- Demonstrating Thought and Action in a Capstone

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

Khoury College GPA Requirement

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

Program Requirement

130 total semester hours required

Plan of Study

Sample Plan of Study: Four Years, Two Co-ops in Spring/Summer 1

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1200 or ARTF 1000		1 ARTG 1290 and ARTG 1291		4 ECON 2350		4 Elective	4
ARTF 1220 (with optional ARTF 1221)	2	ENGW 1111		4 A+D fundamentals elective		2 Elective	4
A+D fundamentals elective	2	DS 2500 and DS 2501		5 A+D fundamentals elective		2	
ARTG 1001 and ARTG 1002	4	MATH 1341		4			
CS 1800 and CS 1802	5						
DS 2000 and DS 2001	4						
	18			17		8	8
Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1210 or EEAM 2000		1 Co-op		0 Co-op		0 Elective	4
DS 3500	4					Elective	4
CS 3200	4						
ARTG 1270 and ARTG 1271	4						
Design option 1	4						
	17			0		0	8
Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
DS 3000		4 Co-op		0 Co-op		0 ENGW 3302, 3314, or 3315	4
Design option 2	4					Elective	4
A+D history elective	4						
Design elective	4						
	16			0		0	8
Year 4							
Fall	Hours	Spring	Hours				
DS 4200		4 ARTG 4550		4			
DS 4300	4	DS 4400		4			
A+D elective	4	Khoury elective		4			
Computing and social issues	4	ARTG 5330 or 5150		4			
	16			16			

Total Hours: 132

Sample Plan of Study: Four Years, Two Co-ops in Summer 2/Fall

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1200 or ARTF 1000		1 ARTG 1290 and ARTG 1291		4 ECON 2350		4 Elective	4
ARTF 1220 (with optional ARTF 1221)		2 DS 2500 and DS 2501		5 A+D fundamentals elective		2 Elective	4
A+D fundamentals elective		2 MATH 1341		4 A+D fundamentals elective		2	
ARTG 1001 and ARTG 1002		4 ENGW 1111		4			
CS 1800 and CS 1802		5					
DS 2000 and DS 2001		4					
		18		17		8	8
Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
DS 3500		4 CS 1210		1 Elective		4 Co-op	0
CS 3200		4 DS 3000		4 Elective		4	
ARTG 1270 and ARTG 1271		4 Design elective		4			
Design option 1		4 A+D history elective		4			
		Computing and social issues		4			
		16		17		8	0
Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		0 Design option 2		4 ENGW 3302, 3314, or 3315		4 Co-op	0
		DS 4200		4 Elective		4	
		DS 4300		4			
		A+ D elective		4			
		0		16		8	0
Year 4							
Fall	Hours	Spring	Hours				
Co-op		0 ARTG 4550		4			
		Khoury elective		4			
		DS 4400		4			
		ARTG 5330 or 5150		4			
		0		16			

Total Hours: 132