Computer Science and Design, BS (Oakland)

The combined major in computer science and design integrates a strong programming foundation with the practice of understanding humans, their surrounding contexts and systems, and designing alternative futures. Students focus on the fundamentals of program design, software development, computer organization, systems and networks, theories of computation, principles of languages, and advanced algorithms and data for developing digital interfaces and applications that allow audiences to take an active role to achieve meaningful goals.

The program also offers students a choice of a design option: experience design, a holistic and integrative approach that focuses on the quality of the human experience in concrete situations; graphic design, the integration of text and image to communicate critical concepts; information design, the visualization and physicalization of data to enhance human understanding of complex knowledge; or interaction design, the creation of navigable interfaces and systems that allow audiences to take an active role to achieve meaningful goals.

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/).

Computer Science Courses

Code	Title	Hours
Computer Science Overview		
Must be taken in alignment with your home college:		
CS 1200	First Year Seminar	1
or ARTF 1000	Art and Design at Northeastern	
CS 1210	Professional Development for Khoury Co-op	1
or EEAM 2000	Professional Development for Co-op	
Computer Science Fundamental 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 2100 and CS 2101	Program Design and Implementation 1 and Lab for CS 2100	5
Computer Science Required Courses		
CS 2484	Principles of Human-Computer Interaction	4
CS 3000	Algorithms and Data	4
CS 3100 and CS 3101	Program Design and Implementation 2 and Lab for CS 3100	5
CS 4530	Fundamentals of Software Engineering	4
or CS 4535	Professional Practicum Capstone	
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 8 semester hours from the following options:		8
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

Design Requirements

Code	Title	Hours
Art + Design Fundamentals Required		
ARTF 1220	Elements of Visual Composition (with optional ARTF 1221)	2
Art + Design Fundamentals Electives		
Complete 6 semester hours from 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 4 semester hours of ARTG courses, as long as prerequisites have been met and courses have not been used to fulfill other requirements of the program (ARTG 2262 and ARTG 2263 are recommended). [1]		4
Art + Design History Elective		
Complete 4 semester hours of ARTH courses (ARTH 1001 Visual Intelligence and ARTH 1002 Seminar in Visual Intelligence are recommended to fulfill this requirement).		4
Art + Design Elective		
Complete 4 semester hours of ARTD, ARTE, ARTF, ARTG, ARTH, ARTS, or GAME courses as long as prerequisites have been met.		4
Degree Capstone Project		
ARTG 4550	Design Degree Project	4

[1] In place of Prototyping with Code (ARTG 2262) and Lab for ARTG 2262 (ARTG 2263), Visualization Technologies 1: Fundamentals (ARTG 5330) is recommended for students considering the PlusOne pathway to a graduate program in information design and data visualization.

Design Option

Code	Title	Hours
Complete one of the following options:		8
Creative Fabrication		
ARTG 2810	Creative Fabrication Design Principles	
ARTG 3810	Topics in Creative Fabrication Inquiry	
Experience Design		
ARTG 3462	Experience Design Principles	
ARTG 3464	Topics In Experience Design Inquiry	
Graphic Design		
ARTG 2252	Graphic Design Principles	
ARTG 3452	Topics In Graphic Design Inquiry	
Information Design		
ARTG 2242	Information Design Principles	
ARTG 3444	Topics in Information Design Inquiry [2]	
Interaction Design		

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

[2] Instead of Topics in Information Design Inquiry (ARTG 3444), Information Design Studio 1: Principles (ARTG 5100) is recommended for students considering the PlusOne in Information Design and Data Visualization.

Degree-Focused Electives

Code	Title	Hours
Complete 8 semester hours from the following lists:		8
Art + Design		
Complete any ARTG course as long as prerequisites have been met. If ARTG 5000 (or any other topics course in the subject listed) is completed more than once, the additional completions may be allowed toward the electives.		
Psychology		
PSYC 1101	Foundations of Psychology	
PSYC 3452	Sensation and Perception	
PSYC 3464	Psychology of Language	
PSYC 3466	Cognition	
Computer Science		
CS 2386	Game Programming 1	
CS 3200	Introduction to Databases	
CS 3520	Programming in C++	
CS 3650	Computer Systems	
CS 3800	Theory of Computation	
CS 4100	Artificial Intelligence	
CS 4150	Game Artificial Intelligence	
CS 4300	Computer Graphics	
CS 4400	Programming Languages	
CS 4520	Mobile Application Development	
CS 4550	Web Development	
CS 4700	Network Fundamentals	
CS 4730	Distributed Systems	
CS 4850	Building Game Engines	
CS 4991	Research	
CS 4992	Directed Study	
DS 3000	Foundations of Data Science	
DS 4200	Information Presentation and Visualization	
DS 4300	Large-Scale Information Storage and Retrieval	
DS 4400	Machine Learning and Data Mining 1	
DS 4420	Machine Learning and Data Mining 2	

Integrative Requirement

Code	Title	Hours
The following courses are used in the major but also count as the integrative requirement:		
ARTG 4550	Design Degree Project	
CS 2484	Principles of Human-Computer Interaction	

Supporting Course

Code	Title	Hours
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	
DS 1300	Knowledge in a Digital World	
or PHIL 1300	Knowledge in a Digital World	

HIST 2220	History of Technology
INSH 2102	Bostonography: The City through Data, Texts, Maps, and Networks
JRNL 3700	Data Storytelling
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 Requirement

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

Required General Electives

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

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
- Exploring Creative Expression and Innovation
- Writing in the First Year
- Writing-Intensive in the Major

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

Computer Science and Design Major Credit Requirement

96 semester hours required in the major

Program Requirement

129 total semester hours required

Plan of Study

Sample Plans of Study

FOUR YEARS, TWO CO-OPS IN SPRING/SUMMER FIRST HALF

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARTG 1001 and ARTG 1002	4	ARTG 1270 and ARTG 1271	4	CS 3100 and CS 3101	5	Vacation	
ARTF 1220 (with optional ARTF 1121)	2	ARTG 1290 and ARTG 1291	4	ARTF elective	2		
CS 1200 or ARTF 1000	1	CS 2100 and CS 2101	5	ARTF elective	2		
CS 1800 and CS 1802	5	ENGW 1111	4				
CS 2000 and CS 2001	5	EEAM 2000 (for CAMD students)	1				

ARTF elective	2						
	19		**18**		**9**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARTG 2262 and ARTG 2263	4	Co-op	0	Co-op	0	General elective	4
CS 1210 (for Khoury students)	1					General elective	4
CS 3000	4						
Design option 1	4						
Degree-focused elective	4						
	17		**0**		**0**		**8**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 2484	4	Co-op	0	Co-op	0	General elective	4
ARTH elective	4			ENGW 3302, 3314, or 3315	4	General elective	4
Computing and social issues	4						
Design option 2	4						
	16		**0**		**4**		**8**

Year 4

Fall	Hours	Spring	Hours
CS 4530 or 4535	4	ARTG 4550	4
Art+design elective	4	CS elective	4
General elective	4	CS elective	4
General elective	4	Degree-focused elective 2	4
	16		**16**

Total Hours: 131

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

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARTG 1001 and ARTG 1002	4	ARTG 1270 and ARTG 1271	4	CS 3100 and CS 3101	5	Vacation	
ARTF 1220 (with optional ARTF 1221)	2	ARTG 1290 and ARTG 1291	4	ARTF elective	2		
CS 1200 or ARTF 1000	1	CS 2100 and CS 2101	5	ARTF elective	2		
CS 1800 and CS 1802	5	ENGW 1111	4				
CS 2000 and CS 2001	5	EEAM 2000 (for CAMD students)	1				
ARTF elective	2						
	19		**18**		**9**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARTG 2262 and ARTG 2263	4	CS 1210 (for Khoury students)	1	General elective	4	Co-op	0
CS 3000	4	CS 2484	4	General elective	4		
Design option 1	4	ARTH elective	4				
Degree-focused elective	4	Computing and social issues	4				
		Design option 2	4				
	16		**17**		**8**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	CS 4530 or 4535	4	General elective	4	Co-op	0
		Art+design elective	4	General elective	4	ENGW 3302, 3314, or 3315	4
		General elective	4				
		General elective	4				
	0		**16**		**8**		**4**

Year 4

Fall	Hours	Spring	Hours
Co-op	0	ARTG 4550	4
		Khoury elective	4
		Khoury elective	4
		Degree-focused elective	4
	0		**16**

Total Hours: 131