

# Computer Science and Design, BS (Boston)

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 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
<b>Computer Science Overview</b>		
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
<b>Computer Science Fundamental Courses</b>		
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 SH 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
<b>Computer Science Required Courses</b>		
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 or CS 4535	Fundamentals of Software Engineering Professional Practicum Capstone	4
<b>Khoury Approved Electives</b>		
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 within 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
<b>Art + Design Fundamentals Required</b>		
ARTF 1220	Elements of Visual Composition (with optional ARTF 1221)	2
<b>Art + Design Fundamentals Electives</b>		
Complete 6 semester hours 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	
<b>Design Required</b>		
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
<b>Design Elective</b>		
Complete 4 semester hours of ARTG courses, as long as prerequisites have been met and that is not used to fulfill other requirements of the program. ARTG 2262 and ARTG 2263 are recommended. <sup>1</sup>		4
<b>Art + Design History Elective</b>		
Complete 4 semester hours of ARTH courses. ARTH 1001 Visual Intelligence and ARTH 1002 Seminar in Visual Intelligence is recommended to fulfill this requirement		4
<b>Art + Design Elective</b>		
Complete 4 semester hours of ARTD, ARTE, ARTF, ARTG, ARTH, ARTS, or GAME courses as long as prerequisites have been met.		4
<b>Degree Capstone Project</b>		
ARTG 4550	Design Degree Project	4

<sup>1</sup> 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 Plus One pathway to a graduate program in Information Design and Data Visualization.

**Design Option**

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

ARTG 2400	Interaction Design Principles (with optional ARTG 2401)
-----------	---

ARTG 3400	Topics In Interaction Design Inquiry
-----------	--------------------------------------

<sup>2</sup> Instead of ARTG 3444, ARTG 5100 is recommended for students considering the Plus One 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
<b>Computing and Social Issues</b>		
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
--------------	------------------------------

## 4 Computer Science and Design, BS (Boston)

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
<b>College Writing</b>		
ENGW 1111	First-Year Writing	4
<b>Advanced Writing in the Disciplines</b>		
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

- 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.

### 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 SH are 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 Art + Design Fundamentals Elective 2		2	
Art + Design Fundamentals Elective 1	2	CS 2100 and CS 2101		5 Art + Design Fundamentals Elective 3		2	
CS 1200 or ARTF 1000	1	ENGW 1111		4			
CS 1800 and CS 1802	5	EEAM 2000 (for CAMD Students)		1			

CS 2000 and CS 2001	5							
	<b>19</b>			<b>18</b>			<b>9</b>	<b>0</b>
<b>Year 2</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>	<b>Hours</b>
ARTG 2262 and ARTG 2263	4	Co-op	0	Co-op	0	General Elective	4	4
CS 1210 (For Khoury Students)	1					General Elective	4	4
CS 3000	4							
Design Option level 1	4							
Degree-focused elective 1	4							
	<b>17</b>			<b>0</b>		<b>0</b>		<b>8</b>
<b>Year 3</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>	<b>Hours</b>
CS 2484	4	Co-op	0	Co-op	0	General Elective	4	4
Art+Design History elective	4			ENGW 3302	4	General Elective	4	4
Computing and social issues	4							
Design Option level 2	4							
	<b>16</b>			<b>0</b>		<b>4</b>		<b>8</b>
<b>Year 4</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>					
CS 4530 or 4535	4	ARTG 4550	4					
Art + Design Elective	4	Khoury Elective 1	4					
General Elective	4	Khoury Elective 2	4					
General Elective	4	Degree-focused elective 2	4					
	<b>16</b>		<b>16</b>					

Total Hours: 131

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

<b>Year 1</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>	<b>Hours</b>
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	Art + Design Fundamentals Elective 2	2			
Art + Design Fundamentals Elective 1	2	CS 2100 and CS 2101	5	Art + Design Fundamentals Elective 3	2			
CS 1200 or ARTF 1000	1	ENGW 1111	4					
CS 1800 and CS 1802	5	EEAM 2000 (For CAMD Students)	1					
CS 2000 and CS 2001	5							
	<b>19</b>		<b>18</b>			<b>9</b>		<b>0</b>
<b>Year 2</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>	<b>Hours</b>
ARTG 2262 and ARTG 2263	4	CS 1210 (For Khoury Students)	1	General Elective	4	Co-op	0	0
CS 3000	4	CS 2484	4	General Elective	4			
Design Option level 1	4	Art + Design History Elective	4					
Degree-focused elective 1	4	Computing and Social Issues	4					

6 Computer Science and Design, BS (Boston)

		Design Option level 2	4				
	<b>16</b>		<b>17</b>		<b>8</b>		<b>0</b>
<b>Year 3</b>							
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>
Co-op	0	CS 4530 or 4535	4	General Elective	4	Co-op	0
		Art + Design Elective	4	General Elective	4	ENGW 3302	4
		General Elective	4				
		General Elective	4				
	<b>0</b>		<b>16</b>		<b>8</b>		<b>4</b>
<b>Year 4</b>							
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>				
Co-op	0	ARTG 4550	4				
		Khoury Elective 1	4				
		Khoury Elective 2	4				
		Degree-focused elective 2	4				
	<b>0</b>		<b>16</b>				

**Total Hours: 131**