Computer Science, BACS (Boston)

The Bachelor of Arts in Computer Science offers a similar curriculum to the BS, with slightly fewer computer science requirements to allow students to study a foreign language and have a wider choice of electives.

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/).

BA Language Requirements

All BA students are required to complete the BA degree language requirements, for a total of 12 semester hours of language study or demonstrated equivalent proficiency, as described in Additional Requirements for BA students (https://catalog.northeastern.edu/undergraduate/university-academics/nupath/ba-requirements/). Successful demonstration of proficiency does not reduce total minimum semester hours of study required to earn the BA degree.

NUpath Requirements

All undergraduate students are required to complete the NUpath Requirements (https://catalog.northeastern.edu/undergraduate/university-academics/nupath/).

Computer Science Requirements

Code	Title	Hours
Computer Science Overview		
CS 1200	First Year Seminar	1
CS 1210	Professional Development for Khoury Co-op	1
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 3000	Algorithms and Data	4
CS 3100 and CS 3101	Program Design and Implementation 2 and Lab for CS 3100	5
CS 3650	Computer Systems	4
CS 3800	Theory of Computation	4
CS 4530	Fundamentals of Software Engineering	4
or CS 4535	Professional Practicum Capstone	
DS 3000	Foundations of Data Science	4
Security Required Course		
Complete one of the following:		4
CY 2550	Foundations of Cybersecurity	
CY 3740	Systems Security	
CY 4740	Network Security	
Presentation Requirement		
Complete one of the following:		4
COMM 1112	Public Speaking	
COMM 1113	Business and Professional Speaking	

COMM 1210	Persuasion and Rhetoric
COMM 1511	Communication and Storytelling
THTR 1125	Improvisation
THTR 1130	Introduction to Acting
THTR 1180	Dynamic Presence: Theatre Training for Effective Interpersonal Interactions
THTR 2345	Acting for the Camera

Khoury Approved Electives

Directed study, project study, and appropriate graduate-level courses may also be taken as upper-division electives with advisor approval.

Complete 4 semester hours from within the following options:

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

Computer Science Concentrations

Choose one of the following concentrations and complete four courses in that concentration. In all concentrations, up to one Research (CS 4991) course can be substituted with college approval. Any missing prerequisites or NUpath requirements must be completed using computer science or general electives.

- Artificial Intelligence (p. 3)
- Foundations (p. 4)
- Human-Centered Computing (p. 4)
- Software (p. 4)
- Systems (p. 4)

SUPPORTING COURSES

Code	Title	Hours
Mathematics Courses		
MATH 1341	Calculus 1 for Science and Engineering	4
MATH 1365	Introduction to Mathematical Reasoning	4
or MATH 1465	Intensive Mathematical Reasoning	
Science Course		
Complete one course from one of the following groups:		4-5
Biology		
BIOL 1111 and BIOL 1112	General Biology 1 and Lab for BIOL 1111	
Chemistry		
CHEM 1161 and CHEM 1162	General Chemistry for Science Majors and Lab for CHEM 1161	
CHEM 1211 and CHEM 1212 and CHEM 1213	General Chemistry 1 and Lab for CHEM 1211 and Recitation for CHEM 1211	
Geology		
ENVR 1200 and ENVR 1201	Dynamic Earth and Lab for ENVR 1200	
Mathematics		
MATH 1342	Calculus 2 for Science and Engineering	
MATH 2280	Statistics and Software	
MATH 2331	Linear Algebra	
MATH 3081	Probability and Statistics	
Physics		
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	Physics 1	
and PHYS 1162	and Lab for PHYS 1161	
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 Requirements

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 3315	Interdisciplinary Advanced Writing in the Disciplines	

Required General Electives

Code	Title	Hours
Complete 40 semester hours of general electives.		40
General electives should include courses to fulfill the BA degree language requirements. (https://catalog.northeastern.edu/undergraduate/university-academics/nupath/ba-requirements/)		

Khoury College GPA Requirement

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

NUpath Requirements Satisfied

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

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

Any missing prerequisites or NUpath requirements must be taken using computer science or general electives.

Program Requirement

133 total semester hours required

Concentrations

CONCENTRATION IN ARTIFICIAL INTELLIGENCE

Code	Title	Hours
CS 4100	Artificial Intelligence	4
DS 4400	Machine Learning and Data Mining 1	4
Complete two of the following courses not already taken:		8
CS 4120	Natural Language Processing	

CS 4150	Game Artificial Intelligence
CS 4180	Reinforcement Learning
CS 4220	Information Retrieval
CS 4610	Robotic Science and Systems
CY 4100	AI Security and Privacy
DS 4420	Machine Learning and Data Mining 2
DS 4440	Practical Neural Networks

CONCENTRATION IN FOUNDATIONS

Code	Title	Hours
CS 2800	Logic and Computation	4
or CS 4820	Computer-Aided Reasoning	
CS 4805	Fundamentals of Complexity Theory	4
or CS 4810	Advanced Algorithms	
Complete two of the following courses not already taken:		8
CS 3950 and CS 4950	Introduction to Computer Science Research and Computer Science Research Seminar	
CS 4805	Fundamentals of Complexity Theory	
CS 4810	Advanced Algorithms	
CS 4820	Computer-Aided Reasoning	
CS 4830	System Specification, Verification, and Synthesis	
CY 4770	Foundations of Cryptography	

CONCENTRATION IN HUMAN-CENTERED COMPUTING*

Code	Title	Hours
CS 2484	Principles of Human-Computer Interaction	4
CS 3484	GUI Programming	4
Complete two of the following courses not already taken:		8
CS 4097	Mixed Reality	
CS 4350	Empirical Research Methods	
CS 4520	Mobile Application Development	
CS 4550	Web Development	
DS 4200	Information Presentation and Visualization	
HINF 5300	Personal Health Interface Design and Development	

CONCENTRATION IN SOFTWARE

Code	Title	Hours
CS 2800	Logic and Computation	4
CS 4400	Programming Languages	4
CS 4700	Network Fundamentals	4
or CS 4730	Distributed Systems	
Complete one of the following courses not already taken:		4
CS 3520	Programming in C++	
CS 4410	Compilers	
CS 4520	Mobile Application Development	
CS 4550	Web Development	
CS 4700	Network Fundamentals	
CS 4730	Distributed Systems	
CS 4820	Computer-Aided Reasoning	
CS 4830	System Specification, Verification, and Synthesis	

CONCENTRATION IN SYSTEMS

Code	Title	Hours
CS 4700	Network Fundamentals	4
or CS 4730	Distributed Systems	
Complete one of the following courses not already taken:		4

CY 3740	Systems Security	
CY 4740	Network Security	
Complete two of the following courses not already taken:		8
CS 3520	Programming in C++	
CS 4300	Computer Graphics	
CS 4360	Non-Interactive Computer Graphics	
CS 4610	Robotic Science and Systems	
CS 4700	Network Fundamentals	
CS 4730	Distributed Systems	
CY 3740	Systems Security	
CY 4740	Network Security	
CY 4760	Security of Wireless and Mobile Systems	

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
CS 1200	1	CS 2100 and CS 2101	5	CS 3100 and CS 3101	5	General elective	4
CS 1800 and CS 1802	5	MATH 1341	4	General elective	4	General elective	4
CS 2000 and CS 2001	5	General elective	4				
ENGW 1111	4	Introductory language course	4				
MATH 1365 or 1465	4						
	19		**17**		**9**		**8**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1210	1	Co-op	0	Co-op	0	General elective	4
CS 3000	4					General elective	4
CS 3650	4						
DS 3000	4						
Introductory language course	4						
	17		**0**		**0**		**8**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 3800	4	Co-op	0	Co-op	0	ENGW 3302	4
Concentration course	4					Science course	4
Concentration course	4						
Additional language requirement	4						
	16		**0**		**0**		**8**

Year 4

Fall	Hours	Spring	Hours
Computing and social issues	4	CS 4530 or 4535	4
Concentration course	4	Concentration course	4
Security course	4	Presentation requirement	4

Khoury elective	4	General elective	4
	16		**16**

Total Hours: 134

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

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1200	1	CS 2100 and CS 2101	5	CS 3000	4	General elective	4
CS 1800 and CS 1802	5	MATH 1341	4	General elective	4	General elective	4
CS 2000 and CS 2001	5	General elective	4				
ENGW 1111	4	Introductory language course	4				
MATH 1365 or 1465	4						
	19		**17**		**8**		**8**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1210	1	CS 3650	4	General elective	4	Co-op	0
CS 3100 and CS 3101	5	CS 3800	4	General elective	4		
DS 3000	4	Concentration course	4				
Concentration course	4	Additional language requirement	4				
Introductory language course	4						
	18		**16**		**8**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	Computing and social issues	4	ENGW 3302 or 3315	4	Co-op	0
		Concentration course	4	General elective	4		
		Khoury elective	4				
		Security course	4				
	0		**16**		**8**		**0**

Year 4

Fall	Hours	Spring	Hours
Co-op	0	CS 4530 or 4535	4
		Concentration course	4
		Presentation requirement	4
		Science course	4
	0		**16**

Total Hours: 134