Computer Science and Behavioral Neuroscience, BS

The Bachelor of Science in Computer Science and Behavioral Neuroscience underscores how research in neuroscience has become a computational field of study. The combined major is designed for students who are interested in applying mathematical and computational methodologies toward understanding human behavior, artificial intelligence, and the human-machine interface. Courses across multiple science disciplines—including biology, chemistry, and computer science—lay a strong foundation necessary to explore brain mechanisms and how they give rise to behavioral functions and pathological states using computational approaches. Students will have an opportunity to develop skills in software development as they apply algorithms and data structures to brain research and neurotechnology.

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/).

Computer Science Requirements

Code	Title	Hours
Overview		
CS 1200	First Year Seminar [1]	1
CS 1210	Professional Development for Khoury Co-op [2]	1
Computer Science Foundations		
CS 1800 and CS 1802	Discrete Structures and Seminar for CS 1800	5
CS 2500 and CS 2501	Fundamentals of Computer Science 1 and Lab for CS 2500	5
CS 2510 and CS 2511	Fundamentals of Computer Science 2 and Lab for CS 2510	5
Computer Science Required Courses		
CS 3000	Algorithms and Data	4
CS 3200	Introduction to Databases	4
CS 3500 and CS 3501	Object-Oriented Design and Lab for CS 3500	5
CS 4100	Artificial Intelligence	4
CS 4500 or CS 4530	Software Development Fundamentals of Software Engineering	4
Statistics Foundation		
Complete one of the following. Students who receive transfer credit for the Advanced Placement Statistics exam may complete the 1 SH PSYC 2315 course (requires department permission):		4-5
ENVR 2500 and ENVR 2501	Biostatistics and Lab for ENVR 2500	
PSYC 2320	Statistics in Psychological Research	

[1] Students entering through the behavioral neuroscience program may take Behavioral Neuroscience at Northeastern (BNSC 1000).

2   Students entering through the behavioral neuroscience program may take Professional Development for Co-op (EESC 2000).

Writing Requirements

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 3307	Advanced Writing in the Sciences	
ENGW 3315	Interdisciplinary Advanced Writing in the Disciplines	

Behavioral Neuroscience Requirements

Code	Title	Hours
COS Foundations		
BIOL 1107 and BIOL 1108	Foundations of Biology and Lab for BIOL 1107	5
BIOL 2299	Inquiries in Biological Sciences	4
BIOL 2301 and BIOL 2302	Genetics and Molecular Biology and Lab for BIOL 2301	5
CHEM 1161 and CHEM 1162 and CHEM 1163	General Chemistry for Science Majors and Lab for CHEM 1161 and Recitation for CHEM 1161	5
CHEM 2311 and CHEM 2312	Organic Chemistry 1 and Lab for CHEM 2311	5
PSYC 1101	Foundations of Psychology	4
Mathematics Foundation		
MATH 1341	Calculus 1 for Science and Engineering	4
or MATH 1251	Calculus and Differential Equations for Biology 1	
Behavioral Neuroscience Foundations		
BIOL 3405	Neurobiology	4
or BIOL 5587	Comparative Neurobiology	
PT 5410 and PT 5411	Functional Human Neuroanatomy and Lab for PT 5410	4-5
or PSYC 3200	Clinical Neuroanatomy	
Psychology Elective		
Complete one of the following:		4
PSYC 3404	Developmental Psychology	
PSYC 3406	Clinical Psychology and Mental Health	
PSYC 3450	Learning and Motivation	
PSYC 3451	Learning Principles and Behavior Analysis	
PSYC 3452	Sensation and Perception	
PSYC 3464	Psychology of Language	
PSYC 3466	Cognition	
PSYC 4524	Cognitive Development	
Behavioral Neuroscience Core Courses		
Complete two of the following:		8
BIOL 3415	Current Topics in Behavioral Neuroscience	
BIOL 3601	Neural Systems and Behavior	
BIOL 3605	Developmental Neurobiology	
BIOL 4705	Neurobiology of Cognitive Decline	
BIOL 4709	Neurobiology of Learning and Memory	
BIOL 5595	Cell and Molecular Neuroscience	
BIOL 5601	Multidisciplinary Approaches in Motor Control	

PSYC 3506	Neuropsychology of Fear	
PSYC 3508	Behavioral Endocrinology	
PSYC 3510	Brain, Behavior, and Immunity	
PSYC 4510	Psychopharmacology	
PSYC 4512	Neuropsychology	
PSYC 4514	Clinical Neuroscience	
PSYC 4570	Behavioral Genetics	

Integrative Requirements

Code	Title	Hours
Integrative Courses		
IS 4300	Human Computer Interaction	4
or CS 4120	Natural Language Processing	
or CS 4180	Reinforcement Learning	
PSYC 4540	Quantitative Topics in Psychology and Behavioral Neuroscience	4
or BINF 6200	Bioinformatics Programming	
Upper-Division Elective		
Complete four credits from the following list, not taken to fulfill previous requirements:		4
BINF 6310	Introduction to Computational Methods in Bioinformatics	
BIOL 3400 or higher		
BNSC 4991 or higher		
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		
PSYC 3200 or higher		

Supporting Courses

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	
HIST 2220	History of Technology	
INSH 2102	Bostonography: The City through Data, Texts, Maps, and Networks	
PHIL 1145	Technology and Human Values	
SOCL 1280	The Twenty-First-Century Workplace	
SOCL 2485	Environment, Technology, and Society	
SOCL 4528	Technology and Society	

Required General Electives

Code	Title	Hours
Complete 16 credits of general electives.		16

Khoury College GPA Requirement

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

Computer Science and Behavioral Neuroscience Major Credit Requirement

102 SH required in the major

NUpath Requirements Satisfied

- Engaging with the Natural and Designed World
- Conducting Formal and Quantitative Reasoning
- Understanding Societies and Institutions
- 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.

Program Requirement

133 total semester hours required

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

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOL 1107 and BIOL 1108	5	BIOL 2299	4	CS 3500 and CS 3501	5	Vacation	
CS 1200	1	CHEM 1161 and CHEM 1162 and CHEM 1163	5	PSYC 1101	4		
CS 1800 and CS 1802	5	CS 2510 and CS 2511	5				
CS 2500 and CS 2501	5	MATH 1341	4				
ENGW 1111	4						
	20		**18**		**9**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOL 2301 and BIOL 2302	5	Co-op		Co-op		PSYC Elective	4
BIOL 3405 or 5587	4					General Elective	4
CS 1210	1						
CS 3000	4						
CS 3200	4						
	18		**0**		**0**		**8**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 2311 and CHEM 2312	5	Co-op		Co-op		General elective	4
PSYC 3200 or PT 5410 *and* PT 5411	4	ENGW 3302, 3307, or 3315	4			General elective	4
Statistics course	4						
General elective	4						
	17		**4**		**0**		**8**

Year 4

Fall	Hours	Spring	Hours
CS 4500 or 4530	4	BINF 6308 or PSYC 4540	4
IS 4300, CS 4120, or CS 4180	4	CS 4100	4
BNS core	4	Computing and social issues	4
BNS core	4	General elective	4
	16		**16**

Total Hours: 134

Four Years, Two Co-ops in Summer 2/Fall

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOL 1107 and BIOL 1108	5	BIOL 2299	4	CS 3500 and CS 3501	5	Vacation	
CS 1200	1	CHEM 1161 and CHEM 1162 and CHEM 1163	5	PSYC 1101	4		
CS 1800 and CS 1802	5	CS 2510 and CS 2511	5				
CS 2500 and CS 2501	5	MATH 1341	4				
ENGW 1111	4						
	20		**18**		**9**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOL 2301 and BIOL 2302	5	CHEM 2311 and CHEM 2312	5	PSYC elective	4	Co-op	
BIOL 3405 or 5587	4	CS 1210	1	General elective	4		
CS 3000	4	PSYC 3200 or PT 5410 *and* PT 5411	4				
CS 3200	4	Statistics course	4				
		General elective	4				
	17		**18**		**8**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		CS 4530	4	Upper-division elective	4	Co-op	
		Computing and Social Issues	4	General elective	4	ENGW 3302, 3307, or 3315 (online)	4
		BNS core	4				
		BNS core	4				
	0		**16**		**8**		**4**

Year 4

Fall	Hours	Spring	Hours
Co-op		BINF 6308 or PSYC 4540	4
		CS 4100	4
		IS 4300, CS 4120, or CS 4180	4
		General elective	4
	0		**16**

Total Hours: 134