

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

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 (<http://catalog.northeastern.edu/undergraduate/university-academics/university-wide-requirements/>).

NUPath Requirements

All undergraduate students are required to complete the NUPath Requirements (<http://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	Database Design	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 or ENGW 1102	First-Year Writing First-Year Writing for Multilingual Writers	4
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 or MATH 1251	Calculus 1 for Science and Engineering Calculus and Differential Equations for Biology 1	4
Behavioral Neuroscience Foundations		
BIOL 3405 or BIOL 5587	Neurobiology Comparative Neurobiology	4
PT 5410 and PT 5411 or PSYC 3200	Functional Human Neuroanatomy and Lab for PT 5410 Clinical Neuroanatomy	4-5
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	

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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 3403	Animal Behavior
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 6308	Bioinformatics Computational Methods 1	

Upper-Division Elective

Complete four credits from the following list, not taken to fulfill previous requirements: 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	
BNSC 4970 or higher	
BIOL 3400 or higher	
BINF 6309	Bioinformatics Computational Methods 2
PSYC 3200 or higher	

Supporting Courses

Code	Title	Hours
Computing and Social Issues		
Complete one of the following: 4		
AFAM 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
ENGL 2150	Literature and Digital Diversity
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	Computers and Society

Required General Electives

Code	Title	Hours
Complete 16 credits of general electives.		16

Khoury College GPA Requirement

Minimum 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:

Five Years, Three Co-ops

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
BIOL 1107 and BIOL 1108	5	BIOL 2299	4	Vacation		Vacation	
CS 1200	1	CHEM 1161 and CHEM 1162 and CHEM 1163	5				
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		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 Vacation	Co-op	
BIOL 3405 or 5587	4 CS 1210	1		
CS 3500 and CS 3501	5 CS 3000	4		
PSYC 1101	4 PSYC 3200	4		
	General elective	4		
	18	18	0	0

Year 3				
Fall	Hours Spring	Hours Summer 1	Hours Summer 2	Hours
Co-op	CS 3200	4 PSYC elective	4 Co-op	
	CS 4500	4 General elective	4	
	BNS core	4		
	Statistics requirement	4		
	0	16	8	0

Year 4				
Fall	Hours Spring	Hours	Summer 2	Hours
Co-op	CS 4100	4	Co-op	
	BNS core	4	ENGW 3302 (online)	4
	CS integrative course	4		
	General elective	4		
	0	16		4

Year 5				
Fall	Hours Spring	Hours		Hours
Co-op	BNS integrative course	4		
	Computing and social issues	4		
	Upper-division elective	4		
	General elective	4		
	0	16		

Total Hours: 134

Four Years, Two Co-ops

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	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 4500	4 Upper-division elective	4 Co-op	
	BNS core	4 General elective	4 ENGW 3302 (online)	4
	BNS core	4		
	CS integrative course	4		
	0	16	8	4

Year 4				
Fall	Hours Spring	Hours		Hours
Co-op	CS 4100	4		
	BNS integrative course	4		
	Computing and social issues	4		
	General elective	4		
	0	16		

Total Hours: 134