# Behavioral Neuroscience, BS (Boston)

## Overview

The behavioral neuroscience curriculum focuses on the biological bases underlying behavior under healthy and pathological states. The program combines the disciplines of biology and psychology with a strong background in basic physical sciences and mathematics to understand how the behavior of humans and animals is controlled by physiological systems. Students gain a solid foundation in the anatomical and functional specializations of the brain and neural mechanisms from neurons to circuits to networks. Students then choose from a range of advanced electives to delve deeply into diverse specializations and current topics in the field.

*Note:* Due to overlap in course content, double majoring in behavioral neuroscience with any of the following majors is not permitted: psychology, biology, cell and molecular biology, or biochemistry.

## 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/).

## Behavioral Neuroscience Foundation Courses

| Code | Title | Hours |
|---|---|---|
| **Introduction to College** | | |
| INSC 1000 | Science at Northeastern | 1 |
| **Experiential Learning Introduction** | | |
| EESC 2000 | Professional Development for Co-op | 1 |
| **Foundation Requirements** | | |
| BIOL 1107<br>and BIOL 1108 | Foundations of Biology<br>and Lab for BIOL 1107 | 5 |
| BIOL 2299 | Inquiries in Biological Sciences | 4 |
| BIOL 2301<br>and BIOL 2302 | Genetics and Molecular Biology<br>and Lab for BIOL 2301 | 5 |
| BIOL 3405 | Neurobiology | 4 |
| PSYC 1101 | Foundations of Psychology | 4 |
| PSYC 3200 | Clinical Neuroanatomy | 4 |
| PSYC 3458 | Biological Psychology | 4 |
| Complete one of the following. Students who receive transfer credit for the Advanced Placement Statistics exam may complete the 1 semester hour PSYC 2315 course (requires department permission): | | 4-5 |
| ENVR 2500<br>and ENVR 2501 | Biostatistics<br>and Lab for ENVR 2500 | |
| PSYC 2320 | Statistics in Psychological Research | |

## Behavioral Neuroscience Advanced Courses

| Code | Title | Hours |
|---|---|---|
| Complete four of the following (at least two must be numbered in the 4000–5999 range): | | 16-17 |
| 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 5587 | Comparative Neurobiology | |
| 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 4540 | Quantitative Topics in Psychology and Behavioral Neuroscience |
| PSYC 4570 | Behavioral Genetics |
| PT 5410<br>and PT 5411 | Functional Human Neuroanatomy<br>and Lab for PT 5410 |
| SLPA 2400 | Neuroscience of Language |
| One course may be an experiential course: | |
| BNSC 4970 | Junior/Senior Honors Project 1 |
| BNSC 4991 | Research |
| BNSC 4994 | Internship |
| PSYC 4965 | Undergraduate Teaching Experience |

## Behavioral Neuroscience Elective Courses

| Code | Title | Hours |
|---|---|---|
| **Psychology Elective** | | |
| An additional behavioral neuroscience core course may be used to fulfill this requirement. | | |
| Complete one of the following: | | 4 |
| INAM 3200 | Creative Cognition | |
| 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 3540 | Environmental Psychology | |
| PSYC 3545 | Ethics in Animal Research | |
| **Biology Elective** | | |
| Complete one of the following: | | 4-5 |
| BIOL 3401 | Comparative Vertebrate Anatomy | |
| BIOL 3409 | Current Topics in Biology | |
| BIOL 3411 | Current Topics in Cell and Molecular Biology | |
| BIOL 3421<br>and BIOL 3422 | Microbiology<br>and Lab for BIOL 3421 | |
| BIOL 3423 | Animal Models in Biomedical Research | |
| BIOL 3603 | Mammalian Systems Physiology | |
| BIOL 3611<br>and BIOL 3612 | Biochemistry<br>and Lab for BIOL 3611 | |
| BIOL 4707 | Cell and Molecular Biology | |
| BIOL 5306 | Biological Clocks | |
| BIOL 5543 | Stem Cells and Regeneration | |
| BIOL 5573 | Medical Microbiology | |
| BIOL 5581 | Biological Imaging | |
| BIOL 5591 | Advanced Genomics | |
| BIOL 5593 | Cell and Molecular Biology of Aging | |
| **Research Elective** | | |
| Complete one of the following: | | 4 |
| BIOL 2309 | Biology Project Lab | |

| | | |
|---|---|---|
| PSYC 4600 | Laboratory in Research Design | |
| PSYC 4604 | Laboratory in Learning and Motivation | |
| PSYC 4606 | Laboratory in Biological Psychology | |
| PSYC 4612 | Laboratory in Cognition | |
| PSYC 4622 | Laboratory in Sensation and Perception | |
| PSYC 4624 | Laboratory in Affective Science | |
| PSYC 4626 | Laboratory in Life-Span Emotional Development | |
| PSYC 4632 | Laboratory in Psychophysiology | |
| **Capstone Course** | | |
| Complete one of the following: | | 4-5 |
| BIOL 4701 | Biology Capstone | |
| BNSC 4971 | Junior/Senior Honors Project 2 | |
| BNSC 4991<br>and BNSC 4900 | Research<br>and Behavioral Neuroscience Capstone | |
| BNSC 4994<br>and BNSC 4900 | Internship<br>and Behavioral Neuroscience Capstone | |
| PSYC 4654 to PSYC 4678 | | |

## Behavioral Neuroscience Supporting Courses

| Code | Title | Hours |
|---|---|---|
| CHEM 1161<br>and CHEM 1162 | General Chemistry for Science Majors<br>and Lab for CHEM 1161 | 5 |
| CHEM 2311<br>and CHEM 2312 | Organic Chemistry 1<br>and Lab for CHEM 2311 | 5 |
| CHEM 2313<br>and CHEM 2314 | Organic Chemistry 2<br>and Lab for CHEM 2313 | 5 |
| MATH 1341 | Calculus 1 for Science and Engineering | 4 |
| or MATH 1241 | Calculus 1 | |
| Complete one of the following. Students interested in the CS option 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 can substitute 4-5 semester hours of CS, CY, or DS coursework at the 2000 level or higher. | | 5 |
| CS 2000<br>and CS 2001 | Introduction to Program Design and Implementation<br>and Lab for CS 2000 | |
| PHYS 1145<br>and PHYS 1146 | Physics for Life Sciences 1<br>and Lab for PHYS 1145 | |
| PHYS 1151<br>and PHYS 1152<br>and PHYS 1153 | Physics for Engineering 1<br>and Lab for PHYS 1151<br>and Interactive Learning Seminar for PHYS 1151 | |
| PHYS 1161<br>and PHYS 1162<br>and PHYS 1163 | Physics 1<br>and Lab for PHYS 1161<br>and Recitation for PHYS 1161 | |
| PHYS 1171<br>and PHYS 1172<br>and PHYS 1173 | Physics 1 for Bioscience and Bioengineering<br>and Lab for PHYS 1171<br>and Interactive Learning Seminar for PHYS 1171 | |

## Writing Requirements

| Code | Title | Hours |
|---|---|---|
| ENGW 1111 | First-Year Writing | 4 |
| or ENGW 1102 | First-Year Writing for Multilingual Writers | |
| ENGW 3307 | Advanced Writing in the Sciences | 4 |
| or ENGW 3315 | Interdisciplinary Advanced Writing in the Disciplines | |
| or ENGW 3302 | Advanced Writing in the Technical Professions | |

## NUPath Requirements Met by Major

- Engaging with the Natural and Designed World (ND)
- Conducting Formal and Quantitative Reasoning (FQ)
- Understanding Societies and Institutions (SI)

- Analyzing and Using Data (AD)
- Writing Across Audiences and Genres
- Integrating Knowledge and Skills Through Experience
- Demonstrating Thought and Action in a Capstone

## Behavioral Neuroscience Major Credit Requirement

Complete 90 semester hours in the major

## Science GPA Requirement (Behavioral Neuroscience)

A minimum 2.000 GPA in the following course codes is required: BIOL, BNSC, CHEM, ENVR, MATH, PHYS, PSYC

## Program Requirement

132 total semester hours required

Due to overlap in course content, double majoring in behavioral neuroscience with any of the following majors is not permitted: psychology, biology, cell and molecular biology, or biochemistry.

## Plan of Study

## Sample Plans of Study

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

**Year 1**

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|---|---|---|---|---|---|---|---|
| INSC 1000 | 1 | BIOL 2299 | 4 | BIOL 2301<br>and BIOL 2302 | 5 | Vacation | |
| BIOL 1107<br>and BIOL 1108 | 5 | CHEM 2311<br>and CHEM 2312 | 5 | Advanced PSYC elective | 4 | | |
| CHEM 1161<br>and CHEM 1162<br>and CHEM 1163 | 5 | ENGW 1111 | 4 | | | | |
| PSYC 1101 | 4 | PSYC 3458 | 4 | | | | |
| MATH 1341 | 4 | | | | | | |
| | **19** | | **17** | | **9** | | **0** |

**Year 2**

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|---|---|---|---|---|---|---|---|
| BIOL 3405 | 4 | EESC 2000 | 1 | PSYC 2320 | 4 | Co-op | 0 |
| CHEM 2313<br>and CHEM 2314 | 5 | BIOL 2309 | 4 | Elective | 4 | | |
| PSYC 3200 | 4 | CS 2000<br>and CS 2001 | 5 | | | | |
| Elective | 4 | BNS advanced course 1 | 4 | | | | |
| | | Elective | 4 | | | | |
| | **17** | | **18** | | **8** | | **0** |

**Year 3**

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|---|---|---|---|---|---|---|---|
| Co-op | 0 | Advanced BIOL elective | 4 | ENGW 3307 | 4 | Co-op | 0 |
| | | BNS advanced course 2 | 4 | Elective | 4 | | |
| | | BNS advanced course 3 | 4 | | | | |
| | | Elective | 4 | | | | |
| | **0** | | **16** | | **8** | | **0** |

**Year 4**

| Fall | Hours | Spring | Hours |
|---|---|---|---|
| Co-op | 0 | BNS advanced course 4 | 4 |
| Elective (online) | 4 | Capstone | 4 |
| | | Elective | 4 |

| | | | |
|---|---|---|---|
| | Elective | 4 | |
| **4** | | **16** | |

**Total Hours: 132**

## FIVE YEARS, THREE CO-OPS IN SPRING/SUMMER FIRST HALF

**Year 1**

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|---|---|---|---|---|---|---|---|
| INSC 1000 | 1 | BIOL 2299 | 4 | Vacation | 0 | Vacation | 0 |
| BIOL 1107<br>and BIOL 1108 | 5 | ENGW 1111 | 4 | | | | |
| CHEM 1161<br>and CHEM 1162<br>and CHEM 1163 | 5 | PSYC 3458 | 4 | | | | |
| PSYC 1101 | 4 | Elective | 4 | | | | |
| MATH 1341 | 4 | | | | | | |
| | **19** | | **16** | | **0** | | **0** |

**Year 2**

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|---|---|---|---|---|---|---|---|
| EESC 2000 | 1 | Co-op | 0 | Co-op | 0 | CHEM 2313<br>and CHEM 2314 | 5 |
| BIOL 2301<br>and BIOL 2302 | 5 | | | | | PSYC 2320 | 4 |
| CHEM 2311<br>and CHEM 2312 | 5 | | | | | | |
| PSYC 3200 | 4 | | | | | | |
| Elective | 4 | | | | | | |
| | **19** | | **0** | | **0** | | **9** |

**Year 3**

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|---|---|---|---|---|---|---|---|
| BIOL 2309 | 4 | Co-op | 0 | Co-op | 0 | Vacation | 0 |
| BIOL 3405 | 4 | | | | | | |
| Advancd PSYC elective | 4 | | | | | | |
| Elective | 4 | | | | | | |
| | **16** | | **0** | | **0** | | **0** |

**Year 4**

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|---|---|---|---|---|---|---|---|
| CS 2000<br>and CS 2001 | 5 | Co-op | 0 | Co-op | 0 | Elective | 4 |
| BNS advanced course 1 | 4 | | | | | | |
| BNS advanced course 2 | 4 | | | | | | |
| Elective | 4 | | | | | | |
| | **17** | | **0** | | **0** | | **4** |

**Year 5**

| Fall | Hours | Spring | Hours |
|---|---|---|---|
| ENGW 3307 | 4 | BNS advanced course 4 | 4 |
| Advanced BIOL elective | 4 | Capstone course | 4 |
| BNS advanced course 3 | 4 | Elective | 4 |
| Elective | 4 | Elective | 4 |
| | **16** | | **16** |

**Total Hours: 132**