

# NEUROSCIENCE AND BEHAVIOR MAJOR (B.S.)

<https://cola.unh.edu/psychology/program/bs/neuroscience-behavior-major>

## Description

The major in neuroscience and behavior (NSB) offers an interdisciplinary approach to human and non-human behavior, focusing on the evolution and adaptiveness of certain behaviors, as well as their underlying neural mechanisms. Students who have always been fascinated by how the brain functions will be well served by this major, as will those who love wild animals and wish to better understand their behavior. The B.S. in neuroscience and behavior is based on a solid foundation in biology, chemistry, physics, statistics, and genetics (foundation courses). These are followed by a two-semester course sequence that covers the fundamentals of neuroscience and behavior. Students can then pick five or more electives focusing on areas of interest.

NSB students are encouraged to take advantage of research experiences in the laboratories of the psychology and biology faculty in the program. This provides valuable experience with cutting-edge equipment and techniques. Some students may share aspects of a larger project, whereas others may be relatively independent and design their own project under supervision. In either case, important skills are gained by the discipline of gathering data, analyzing and interpreting it, and presenting it to a broader audience.

The curriculum provides most of the requirements and recommended courses for students seeking admission to graduate school and to professional schools in medicine and veterinary medicine. Students who might choose not to go on to advanced degrees are well-prepared for employment as skilled technicians in research laboratories or, if their interests are in animal behavior, as field research assistants or animal trainers. With additional courses in education, the B.S. in NSB also qualifies graduates to teach at the elementary, junior high, and high school levels.

Faculty participating in the NSB major combine a love of teaching and student mentoring with a passion for research, and encourage student participation. Research facilities that students can use include the Integrative Animal Behavior and Ecoacoustics laboratory, the confocal imaging center, the Hubbard Center for Genomic Studies, and the many marine, freshwater, and estuarine laboratories associated with UNH programs. Students can also take summer courses at the Shoals Marine Laboratory.

## Requirements

### Degree Requirements

**Minimum Credit Requirement:** 128 credits

**Minimum Residency Requirement:** 32 credits must be taken at UNH

**Minimum GPA:** 2.0 required for conferral\*

**Core Curriculum Required:** Discovery & Writing Program Requirements

**Foreign Language Requirement:** No

All Major, Option and Elective Requirements as indicated.

\*Major GPA requirements as indicated.

## Major Requirements

- Students majoring in NSB are required to take foundation courses in basic science, core courses, and five electives from an extensive list of courses, including some offered by other departments including biochemistry, molecular and cellular biology, and natural resources.
- Minimum grade of D- or better is required in CHEM 403, CHEM 404, CHEM 545/CHEM 546, and PHYS 401; minimum grade of C- or better is required in all other courses.
- A capstone experience is required. This may be independent research, an advanced seminar, or other special student activity. It is meant to integrate prior experience and take the student to a new level in an area of special interest.

Code	Title	Credits
<b>Foundation Courses</b>		
NSB 400	Topics Neuroscience & Behavior	1
BIOL 411 & BIOL 412	Introductory Biology: Molecular and Cellular and Introductory Biology: Evolution, Biodiversity and Ecology (2 semesters)	8
CHEM 403 & CHEM 404	General Chemistry I and General Chemistry II (2 semesters)	8
CHEM 545 & CHEM 546	Organic Chemistry and Organic Chemistry Laboratory	5
BMCB 658 & BMCB 659	General Biochemistry and General Biochemistry Lab	5
PHYS 401	Introduction to Physics I	4
PSYC 402 or BIOL 528	Statistics in Psychology Applied Biostatistics I	4
GEN 604	Principles of Genetics	4
NSB 500 & NSB 501	Fundamentals of Neuroscience and Behavior I and Fundamentals of Neuroscience and Behavior I Laboratory	5
NSB 502 & NSB 503	Fundamentals of Neuroscience and Behavior II/Systems Neuroscience and Fundamentals of Neuroscience and Behavior II Laboratory	5
<b>Electives</b>		
Select five courses from the following:		20-22
BIOL 541W	Ecology	
BIOL 714W	Model Organisms in Biological and Medical Research	
BIOL 775	Plant Rx	
BMCB 605	Principles of Cell Biology	
BMCB 760	Pharmacology	
BMS 507 & BMS 508	Human Anatomy and Physiology I and Human Anatomy and Physiology II <sup>1</sup>	
BMS 702	Endocrinology	
BMS 711	Toxicology	
BMS 718	Mammalian Physiology	
COMM 798	Special Topics (C)	
GEN 706	Human Genetics	
KIN 706 & KIN 707	Neurology and Neurology Lab <sup>1</sup>	
MEFB 714	Field Animal Behavior (SML, C)	
NSB 727	Animal Communication (C)	
PHIL 630	Neuroscience and Philosophy	
PSYC 511	Sensation and Perception	
PSYC 512	Psychology of Primates	
PSYC 513	Cognitive Psychology	
PSYC 521	Behavior Analysis	
PSYC 710	Visual Perception (C)	
PSYC 720	Animal Cognition (C)	
PSYC 731	Brain and Behavior (C)	
PSYC 733	Drugs and Behavior (C)	
PSYC 735	Neurobiology of Mood Disorders (C)	
PSYC 736	Attention Disorders (C)	
PSYC 741W	Special Topics (C) (Approved topics only see footnote) <sup>1</sup>	

ZOOL 613W	Animal Behavior
ZOOL 625 & ZOOL 626W	Principles of Animal Physiology and Animal Physiology Laboratory <sup>2</sup>
ZOOL 690	Evolution
ZOOL 726	Conservation Behavior (C)
ZOOL 733W	Behavioral Ecology (C)
ZOOL 736	Genes and Behavior (C)
ZOOL 740	Acoustic Ecology (C)
ZOOL 777W	Neuroethology (C)
795/796 or 799 Independent Study, (C) <sup>3</sup>	
<b>Capstone</b>	
Select from the following options: <sup>4</sup>	
1.) Complete a Capstone designated course (C) from above	
2.) One semester of Capstone Research:	
BIOL 795	Independent Investigations in Biology
or PSYC 795	Independent Study
or INCO 790	Advanced Research Experience
3.) Honor's Thesis:	
NSB 799H	Honors Senior Thesis
or BIOL 799H	Honors Senior Thesis
or PSYC 797	Senior Honors Tutorial
or PSYC 799	Senior Honors Thesis
4.) Advisor approved alternative	
<b>Total Credits</b> 69-71	

<sup>1</sup> Must be one of the following approved topics: Fundamentals of Substance Abuse, Neurobiology of Spatial Cognition, Fundamentals of Cognitive Science, Neuroscience of Memory, Behavioral Neuroscience, or Science of Daydreaming.

<sup>2</sup> Both must be taken to count as one of the 5 required major electives

<sup>3</sup> One experience totaling at least 4 credits, but can be earned over the course of two consecutive semesters provided the experience is with the same research mentor. Can only substitute for one elective.

<sup>4</sup> Courses that are eligible to fulfill the Capstone requirement are indicated with a (C) and must be taken senior year. You can: 1) designate a course as a Capstone course, with additional requirements as determined by the instructor; 2) complete one semester of Capstone Research course 3) do an honors thesis in Neuroscience and Behavior or Biology or Psychology or; 4) participate in an alternative activity with approval from the student's academic advisor.

Discovery Program Requirements

NSB majors may use BIOL 411, BIOL 412, CHEM 403, CHEM 404, PHYS 401, PHYS 407 and either PSYC 402 or BIOL 528 to fulfill the Biological Sciences, Physical Sciences, Discovery Lab, and Quantitative Reasoning Discovery requirements.

Additional Information

Students transferring into the NSB program from other UNH majors must hold a cumulative GPA of at least 3.2 at the time of requested major change.

Degree Plan

Sample Degree Plan

*This sample degree plan serves as a general guide; students collaborate with their academic advisor to develop a personalized degree plan to meet their academic goals and program requirements.*

<b>First Year</b>		
<b>Fall</b>		
		<b>Credits</b>
BIOL 411	Introductory Biology: Molecular and Cellular	4
CHEM 403	General Chemistry I	4
NSB 400	Topics Neuroscience & Behavior	1
ENGL 401	First-Year Writing (or Discovery Course)	4
Discovery Course		4
<b>Credits</b>		<b>17</b>
<b>Spring</b>		
BIOL 412	Introductory Biology: Evolution, Biodiversity and Ecology	4
CHEM 404	General Chemistry II	4
BIOL 528	Applied Biostatistics I	4
or PSYC 402	or Statistics in Psychology	
ENGL 401	First-Year Writing (or Discovery Course)	4
<b>Credits</b>		<b>16</b>
<b>Second Year</b>		
<b>Fall</b>		
NSB 500 & NSB 501	Fundamentals of Neuroscience and Behavior I and Fundamentals of Neuroscience and Behavior I Laboratory	5
NSB Elective 1		4
GEN 604 or PHYS 401	Principles of Genetics or Introduction to Physics I	4
Discovery Course		4
<b>Credits</b>		<b>17</b>
<b>Spring</b>		
NSB 502 & NSB 503	Fundamentals of Neuroscience and Behavior II/Systems Neuroscience and Fundamentals of Neuroscience and Behavior II Laboratory	5
NSB Elective 2		4
GEN 604	Principles of Genetics	4
Discovery Course		4
<b>Credits</b>		<b>17</b>
<b>Third Year</b>		
<b>Fall</b>		
CHEM 545 & CHEM 546	Organic Chemistry and Organic Chemistry Laboratory (or Spring)	5
NSB Elective 3		4
Discovery/Elective Course		4
Discovery/Elective Course		4
<b>Credits</b>		<b>17</b>
<b>Spring</b>		
BMCB 658 & BMCB 659	General Biochemistry and General Biochemistry Lab (or SR Fall)	5
NSB Elective 4		4
Discovery/Elective Course		4
Discovery/Elective Course		4
<b>Credits</b>		<b>17</b>

**Fourth Year****Fall**

NSB Elective 5	4
PHYS 401      Introduction to Physics I	4
Discovery/Elective Course	4
Discovery/Elective Course	4
<b>Credits</b>	<b>16</b>

**Spring**

Discovery/Elective Course	4
Discovery/Elective Course	4
Discovery/Elective Course	4
Discovery/Elective Course	4
<b>Credits</b>	<b>16</b>
<b>Total Credits</b>	<b>133</b>

## Students demonstrate that they can communicate effectively.

- Demonstrate scientific writing skills, and proficiency in delivering oral presentations related to both the primary literature and findings from student investigations in neuroscience and behavior.
- Students practice science responsibly and ethically, and acknowledge the influence of cultural and historical biases in the sciences.

## Student Learning Outcomes

### Program Learning Outcomes

#### Students demonstrate that they understand basic principles of neuroscience and behavior.

- Apply the core principles of biology, chemistry, physics, and statistics to more advanced concepts in neuroscience and behavior.
- Apply the principles of evolution and genetics to understand how genotype and phenotype affect the structure and function of animal nervous systems and behavior.
- Describe the basic features of animal nervous system development, organization, signaling, integration, and higher-level processing, and how these are altered in diseases of the nervous system.
- Explain the four levels of analysis emphasized in modern animal behavior research: causation, development, function, and evolution.
- Describe molecular and cellular approaches to the study of brain structure, function, and development, as well as behavioral and cognitive neuroscience approaches to studying higher level brain functions.

#### Students demonstrate that they can undertake scientifically valid methods of inquiry.

- Apply appropriate research methods, laboratory techniques, and statistical methods to investigate scientific questions in neuroscience and behavior.

#### Students demonstrate that they can think critically and analytically.

- Read and critique primary research literature related to the nervous system, how nervous system function generates behavior, and how behavior addresses fitness-related challenges across a diversity of species.