NEUROSCIENCE MAJOR (BSOS)

The Neuroscience major is jointly offered by the Departments of Biology in the College of Computer, Mathematical, and Natural Sciences and Psychology (https://academiccatalog.umd.edu/undergraduate/colleges-schools/behavioral-social-sciences/psychology) in the College of Behavioral and Social Sciences.

The Neuroscience major offers rigorous training in the interdisciplinary study of brain and behavior. Students complete a required set of NEUR courses as well as a supporting sequence of coursework in mathematics, biology, chemistry, physics, and psychology. Students then choose an upper-level specialization and coursework in (1) cellular, molecular, and physiological neuroscience or (2) behavioral and cognitive neuroscience. The Neuroscience major prepares students for a broad range of career paths including: scientific research, medicine, clinical psychology, allied health professions, or science-related government, nonprofit, or private sector employment.

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Admission to the Major

The Neuroscience major is a Limited Enrollment Program. Information on limited enrollment programs can be found at: lep.umd.edu.

Transfer Admission Requirements

Students beyond their first semester and those off campus wishing to transfer are required to meet the following gateway criteria:

- Completion of MATH 135 or 140 with a minimum grade of C-
- Completion of BSCI 170/171 (formerly BSCI 105) with a minimum grade of C-
- Completion of CHEM 131/132 and CHEM 231/232 with a minimum grade of C-
- A minimum grade point average of 2.0 in all courses is required at the 45-credit benchmark review for first-time freshmen.
- A minimum grade point average of 2.7 in all courses taken at the University of Maryland and all other institutions is required for internal and external transfer to the Neuroscience major.
- All other students, including both internal and external transfer students, will be admitted to the program only if they have met the above LEP requirements and also have a minimum cumulative GPA based on all previous college-level coursework of 2.70 or higher.

Program Learning Outcomes

1. Develop a knowledge base in the field of neuroscience and supporting disciplines
   a. Understand the fundamental principles of neuroscience across all levels of analysis – molecular/cellular, circuits, systems, and behavior
   b. Understand the principles of evolution, especially as they apply to the nervous system and behavior
   c. Develop additional expertise and depth of knowledge in at least one area of neuroscience (molecular/cellular, circuits, systems, and behavior)
   d. Be able to address a question in neuroscience by integrating information from multiple levels of analysis

2. Understand the current techniques and strategies in neuroscience research
   a. Understand the theory and practice of important current neuroscience research techniques, along with their strengths and limitations
   b. Acquire laboratory experience through neuroscience courses or research
   c. Develop skills in data analysis using relevant quantitative and programming methods
   d. Obtain training to work comfortably and successfully within a research team or equivalent experience

3. Develop competence in scientific reasoning and critical thinking
   a. Be able to critically evaluate scientific literature, including assessment of the problems addressed, methodology used (including statistical analyses), and conclusions drawn
   b. Demonstrate skill in innovative and integrative thinking and problem-solving
   c. Demonstrate skill in experimental design and interpretation

4. Develop effective professional communication skills
   a. Demonstrate proficiency in clear, concise, and graceful writing
   b. Demonstrate proficiency with oral communication in a range of professional situations
   c. Demonstrate proficiency in graphical presentation of information integrated into both written and oral presentations

5. Understand the role of neuroscience in social and cultural contexts as well as the influences of social and cultural context on neuroscience
   a. Understand the influences, current and potential, of neuroscience on other fields such as medicine, education, the arts, and the social sciences
   b. Recognize the relationships between scientific research and the culture(s) in which it is embedded
   c. Understand and follow ethical practices in academic study, scientific research, and professional life

6. Develop an appreciation of possible career paths available to students proficient in neuroscience
   a. Understand the activities, opportunities, and responsibilities of the individual scientist within the scientific community
   b. Recognize the range of career opportunities outside academia
   c. Develop and, as far as possible, implement plans for career development
Requirements

Gateway Requirements
All students accepted directly as freshman into the Neuroscience major must complete a series of gateway courses and a review at 45 credits. Gateway criteria include:

- Completion of MATH 135 or 140 with a minimum grade of C-
- Completion of BSCI 170/171 (formerly BSCI 105) with a minimum grade of C-
- Completion of CHEM 131/132 and CHEM 231/232 with a minimum grade of C-
- A minimum grade point average of 2.0 in all courses is required at the 45-credit benchmark review for first-time freshmen.
- A minimum grade point average of 2.7 in all courses taken at the University of Maryland and all other institutions is required for internal and external transfer to the Neuroscience major.
- All other students, including both internal and external transfer students, will be admitted to the program only if they have met the above LEP requirements and also have a minimum cumulative GPA based on all previous college-level coursework of 2.70 or higher.

Requirements for the Major

Course Title Credits
NEUR Required Courses
NEUR200 (GenEd: NS) Introduction to Neuroscience 3
NEUR305 Neuroscience Fundamentals I 3
NEUR306 Neuroscience Fundamentals II 3
NEUR405 Neurobiology Lab 4

Required Supporting Courses
MATH135 Discrete Mathematics for Life Sciences 4
MATH140 or MATH141 Calculus I 4
MATH136 Calculus for Life Sciences 4
or MATH141 Calculus II 4
STATISTICS BIOM301, EPIB300, PSYC200, STAT400, or STAT464 3
BSCI170 Principles of Molecular & Cellular Biology 4
& BSCI171 and Principles of Molecular & Cellular Biology Laboratory
BSCI160 Principles of Ecology and Evolution 4
& BSCI161 and Principles of Ecology and Evolution Lab
CHEM131 Chemistry I - Fundamentals of General Chemistry 4
& CHEM132 and General Chemistry I Laboratory
CHEM231 Organic Chemistry I 4
& CHEM232 and Organic Chemistry Laboratory I
CHEM241 Organic Chemistry II 4
& CHEM242 and Organic Chemistry Laboratory II
CHEM271 General Chemistry and Energetics 4
& CHEM272 and General Bioanalytical Chemistry Laboratory
PHYS131 Fundamentals of Physics for Life Sciences I 4
or PHYS141 Principles of Physics
PHYS132 Fundamentals of Physics for Life Sciences II 4
or PHYS142 Principles of Physics
PSYC100 Introduction to Psychology 3
UNIV100 The Student in the University (or equivalent) 1

Concentration Courses

Complete at least 5 courses, including at least 3 courses from within one concentration and at least 1 lab course

MOLECULAR, CELLULAR, AND PHYSIOLOGICAL CONCENTRATION 3
BCHM463 Biochemistry of Physiology
BSCI222 Principles of Genetics 4
BSCI330 Cell Biology and Physiology
BSCI339 Selected Topics in Biology (BSCI339D: Biology of Chemosensory Systems)
BSCI339 Selected Topics in Biology (BSCI339F: Neurophysiology of Cells and Circuits)
BSCI402 Genomics of Sensory Systems
BSCI403 Biology of Vision
BSCI410 Molecular Genetics
BSCI415 Molecular Genetics Laboratory
BSCI430 Developmental Biology
BSCI440 Mammalian Physiology
& BSCI441 and Mammalian Physiology Laboratory
BSCI446 Neural Systems
BSCI452 Diseases of the Nervous System
KNES370 Motor Development
KNES462 Neural Basis of Human Movement
NEUR379 (Neuroscience Research: Molecular and Cellular)
NEUR479 (Neuroscience Research Lab; BSCI399(H, L) may be substituted with permission)
PSYC404 Introduction to Behavioral Pharmacology
SPECIAL BSCI338 or BSCI339 when specifically approved.
TOPICS Check with your advisor.

BEHAVIORAL AND COGNITIVE CONCENTRATION 3
BSCI222 Principles of Genetics 4
BSCI330 Cell Biology and Physiology
BSCI360 Principles of Animal Behavior
BSCI401 Animal Communication
BSCI446 Neural Systems
KNES385 Motor Control and Learning
KNES498 Special Topics in Kinesiology (KNES498C: Exercise and Brain Health)
NEUR379 (Neuroscience Research: Behavioral and Cognitive)
NEUR479 (Neuroscience Research Lab; BSCI399(H, L) may be substituted with permission)
PHIL209 Philosophical Issues (PHIL209N: Know Thyself: Wisdom Through Cognitive Science)
PHIL366 Philosophy of Mind
PSYC302 Fundamentals of Learning and Behavior
PSYC341 Introduction to Memory and Cognition
PSYC402 Neural Systems and Behavior
PSYC403 Animal Behavior
PSYC404 Introduction to Behavioral Pharmacology
PSYC406 Neuroethology
PSYC407 Behavioral Neurobiology Laboratory
PSYC413 Developmental Cognitive/Social Neuroscience
PSYC414 Science of Sleep and Biological Rhythms
PSYC442 Psychology of Language
PSYC455 Cognitive Development
### Neuroscience Major (BSOS)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PSYC489</td>
<td>Advanced Special Topics in Psychology</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(PSYC489G: Hormones &amp; Behavior)</td>
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**Total Credits: 76-80**

1. Up to 3 pre-approved Neuroscience Research credits can be applied to the major.
2. 4 pre-approved NEUR479 credits in the same faculty research laboratory can satisfy the lab requirement.
3. Courses may be occasionally added or removed from this list. Not all courses may be available each semester.
4. Students may not use both ANSC327 and BSCI222 toward filling Neuroscience concentration requirements.