NEUROSCIENCE MAJOR (CMNS)

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.

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEUR200</td>
<td>((GenEd: NS) Introduction to Neuroscience)</td>
<td>3</td>
</tr>
<tr>
<td>NEUR305</td>
<td>(Neuroscience Fundamentals I)</td>
<td>3</td>
</tr>
<tr>
<td>NEUR306</td>
<td>(Neuroscience Fundamentals II)</td>
<td>3</td>
</tr>
<tr>
<td>NEUR405</td>
<td>(Neurobiology Lab)</td>
<td>4</td>
</tr>
</tbody>
</table>

#### NEUR Required Courses

- **Course:** NEUR200  
  **Title:** ((GenEd: NS) Introduction to Neuroscience  
  **Credits:** 3

- **Course:** NEUR305  
  **Title:** (Neuroscience Fundamentals I)  
  **Credits:** 3

- **Course:** NEUR306  
  **Title:** (Neuroscience Fundamentals II)  
  **Credits:** 3

- **Course:** NEUR405  
  **Title:** (Neurobiology Lab)  
  **Credits:** 4

#### Required Supporting Courses

- **Course:** MATH135  
  **Title:** Discrete Mathematics for Life Sciences  
  **Credits:** 4

- **Course:** MATH136  
  **Title:** Calculus for Life Sciences  
  **Credits:** 4

- **Course:** STATISTICS  
  **Title:** BIOM301, EPIB300, PSYC200, STAT400, or STAT464  
  **Credits:** 3

- **Course:** BSCI170  
  **Title:** Principles of Molecular & Cellular Biology  
  & BSCI171  
  **Title:** Principles of Molecular & Cellular Biology Laboratory  
  **Credits:** 4

- **Course:** BSCI160  
  **Title:** Principles of Ecology and Evolution  
  & BSCI161  
  **Title:** Principles of Ecology and Evolution Lab  
  **Credits:** 4

- **Course:** CHEM131  
  **Title:** Chemistry I - Fundamentals of General Chemistry  
  & CHEM132  
  **Title:** General Chemistry I Laboratory  
  **Credits:** 4

- **Course:** CHEM231  
  **Title:** Organic Chemistry I  
  & CHEM232  
  **Title:** Organic Chemistry Laboratory I  
  **Credits:** 4

- **Course:** CHEM241  
  **Title:** Organic Chemistry II  
  & CHEM242  
  **Title:** Organic Chemistry Laboratory II  
  **Credits:** 4

- **Course:** CHEM271  
  **Title:** General Chemistry and Energetics  
  & CHEM272  
  **Title:** General Bioanalytical Chemistry Laboratory  
  **Credits:** 4

- **Course:** PHYS131  
  **Title:** Fundamentals of Physics for Life Sciences I  
  or PHYS141  
  **Title:** Principles of Physics  
  **Credits:** 4

- **Course:** PHYS132  
  **Title:** Fundamentals of Physics for Life Sciences II  
  or PHYS142  
  **Title:** Principles of Physics  
  **Credits:** 4

- **Course:** PSYC100  
  **Title:** Introduction to Psychology  
  **Credits:** 3

- **Course:** UNIV100  
  **Title:** The Student in the University (or equivalent)  
  **Credits:** 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**

- **Course:** BCHM463  
  **Title:** Biochemistry of Physiology  
  **Credits:**

- **Course:** BSCI222  
  **Title:** Principles of Genetics  
  **Credits:**

- **Course:** BSCI330  
  **Title:** Cell Biology and Physiology  
  **Credits:**

- **Course:** BSCI339  
  **Title:** Selected Topics in Biology (BSCI339D: Biology of Chemosensory Systems)  
  **Credits:**

- **Course:** BSCI339  
  **Title:** Selected Topics in Biology (BSCI339F: Neurophysiology of Cells and Circuits)  
  **Credits:**

- **Course:** BSCI402  
  **Title:** Genomics of Sensory Systems  
  **Credits:**

- **Course:** BSCI403  
  **Title:** Biology of Vision  
  **Credits:**

- **Course:** BSCI410  
  **Title:** Molecular Genetics  
  **Credits:**

- **Course:** BSCI415  
  **Title:** Molecular Genetics Laboratory  
  **Credits:**

- **Course:** BSCI430  
  **Title:** Developmental Biology  
  **Credits:**

- **Course:** BSCI440  
  **Title:** Mammalian Physiology  
  & BSCI441  
  **Title:** Mammalian Physiology Laboratory  
  **Credits:**

**BEHAVIORAL AND COGNITIVE CONCENTRATION ³**

- **Course:** BSCI446  
  **Title:** Neural Systems  
  **Credits:**

- **Course:** BSCI452  
  **Title:** Diseases of the Nervous System  
  **Credits:**

- **Course:** KNES370  
  **Title:** Motor Development  
  **Credits:**

- **Course:** KNES462  
  **Title:** Neural Basis of Human Movement  
  **Credits:**

- **Course:** NEUR379  
  **Title:** (Neuroscience Research: Molecular and Cellular)  
  **Credits:**

- **Course:** NEUR479  
  **Title:** (Neuroscience Research Lab; BSCI399(H, L) may be substituted with permission)  
  **Credits:**

- **Course:** PSYC404  
  **Title:** Introduction to Behavioral Pharmacology  
  **Credits:**

**TOPICS**

- **Course:** SPECIAL  
  **Title:** BSCI338 or BSCI339 when specifically approved.  
  **Credits:**

**BEHAVIORAL AND COGNITIVE CONCENTRATION ³**

- **Course:** BSCI222  
  **Title:** Principles of Genetics  
  **Credits:**

- **Course:** BSCI330  
  **Title:** Cell Biology and Physiology  
  **Credits:**

- **Course:** BSCI360  
  **Title:** Principles of Animal Behavior  
  **Credits:**

- **Course:** BSCI401  
  **Title:** Animal Communication  
  **Credits:**

- **Course:** BSCI446  
  **Title:** Neural Systems  
  **Credits:**

- **Course:** KNES385  
  **Title:** Motor Control and Learning  
  **Credits:**

- **Course:** KNES498  
  **Title:** Special Topics in Kinesiology (KNES498C: Exercise and Brain Health)  
  **Credits:**

**TOPICS**

- **Course:** NEUR379  
  **Title:** (Neuroscience Research: Behavioral and Cognitive)  
  **Credits:**

- **Course:** NEUR479  
  **Title:** (Neuroscience Research Lab; BSCI399(H, L) may be substituted with permission)  
  **Credits:**

**TOPICS**

- **Course:** PHIL209  
  **Title:** Philosophical Issues (PHIL209N: Know Thyself: Wisdom Through Cognitive Science)  
  **Credits:**

- **Course:** PHIL366  
  **Title:** Philosophy of Mind  
  **Credits:**

- **Course:** PSYC302  
  **Title:** Fundamentals of Learning and Behavior  
  **Credits:**

- **Course:** PSYC341  
  **Title:** Introduction to Memory and Cognition  
  **Credits:**

- **Course:** PSYC402  
  **Title:** Neural Systems and Behavior  
  **Credits:**

- **Course:** PSYC403  
  **Title:** Animal Behavior  
  **Credits:**

- **Course:** PSYC404  
  **Title:** Introduction to Behavioral Pharmacology  
  **Credits:**

- **Course:** PSYC406  
  **Title:** Neuroethology  
  **Credits:**

- **Course:** PSYC407  
  **Title:** Behavioral Neurobiology Laboratory  
  **Credits:**

- **Course:** PSYC413  
  **Title:** Developmental Cognitive/Social Neuroscience  
  **Credits:**

- **Course:** PSYC414  
  **Title:** Science of Sleep and Biological Rhythms  
  **Credits:**

- **Course:** PSYC442  
  **Title:** Psychology of Language  
  **Credits:**

- **Course:** PSYC455  
  **Title:** Cognitive Development  
  **Credits:**

- **Course:** PSYC489  
  **Title:** Advanced Special Topics in Psychology (PSYC489G: Hormones & Behavior)  
  **Credits:**

**Total Credits:** 76-80

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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.