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 (http://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 MATH130, MATH135 or MATH140 with a minimum grade of C-
- Completion of BSCI170 AND BSCI171 (formerly BSCI 105) and BSCI160 AND BSCI161 (formerly BSCI 106) with a minimum grade of C-
- Completion of CHEM131 AND CHEM132 and CHEM231 AND CHEM232 with a minimum grade of C-

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 students.

Program Learning Outcomes

1. Develop a knowledge base in the field of neuroscience and supporting disciplines: understand the fundamental principles of neuroscience across all levels of analysis – molecular/cellular, circuits, systems, and behavior, understand the principles of evolution, especially as they apply to the nervous system and behavior, develop additional expertise and depth of knowledge in at least one area of neuroscience (molecular/cellular, circuits, systems, and behavior), and 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: understand the theory and practice of important current neuroscience research techniques, along with their strengths and limitations, acquire laboratory experience through neuroscience courses or research, develop skills in data analysis using relevant quantitative and programming methods, and obtain training to work comfortably and successfully within a research team or equivalent experience

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

4. Develop effective professional communication skills: demonstrate proficiency in clear, concise, and graceful writing, demonstrate proficiency with oral communication in a range of professional situations, and 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: understand the influences, current and potential, of neuroscience on other fields such as medicine, education, the arts, and the social sciences, recognize the relationships between scientific research and the culture(s) in which it is embedded, and 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: understand the activities, opportunities, and responsibilities of the individual scientist within the scientific community, recognize the range of career opportunities outside academia, and develop and, as far as possible, implement plans for career development

Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEUR200</td>
<td>Introduction to Neuroscience (GenEd: NS)</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>
<tr>
<td>MATH135</td>
<td>Discrete Mathematics for Life Sciences</td>
<td>4</td>
</tr>
<tr>
<td>or MATH140</td>
<td>Calculus I</td>
<td></td>
</tr>
<tr>
<td>MATH136</td>
<td>Calculus for Life Sciences</td>
<td>4</td>
</tr>
<tr>
<td>or MATH141</td>
<td>Calculus II</td>
<td></td>
</tr>
<tr>
<td>STATISTICS</td>
<td>BIOM301, EPIB300, PSYC200, STAT400, or STAT464</td>
<td>3</td>
</tr>
<tr>
<td>BSCI170</td>
<td>Principles of Molecular &amp; Cellular Biology</td>
<td>4</td>
</tr>
<tr>
<td>&amp; BSCI171</td>
<td>and Principles of Molecular &amp; Cellular Biology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BSCI160</td>
<td>Principles of Ecology and Evolution</td>
<td>4</td>
</tr>
<tr>
<td>&amp; BSCI161</td>
<td>and Principles of Ecology and Evolution Lab</td>
<td></td>
</tr>
<tr>
<td>CHEM131</td>
<td>Chemistry I - Fundamentals of General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM132</td>
<td>and General Chemistry I Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM231</td>
<td>Organic Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM232</td>
<td>and Organic Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td>CHEM241</td>
<td>Organic Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM242</td>
<td>and Organic Chemistry Laboratory II</td>
<td></td>
</tr>
<tr>
<td>CHEM271</td>
<td>General Chemistry and Energetics</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM272</td>
<td>and General Bioanalytical Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>PHYS131</td>
<td>Fundamentals of Physics for Life Sciences I</td>
<td>4</td>
</tr>
<tr>
<td>or PHYS141</td>
<td>Principles of Physics</td>
<td></td>
</tr>
<tr>
<td>PHYS132</td>
<td>Fundamentals of Physics for Life Sciences II</td>
<td>4</td>
</tr>
</tbody>
</table>
Neuroscience Major (CMNS)

or PHYS142  Principles of Physics
PSYC100  Introduction to Psychology 3
UNIV100  The Student in the University (or equivalent) 1

<table>
<thead>
<tr>
<th>Concentration Courses 1,2</th>
<th>16-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete at least 5 courses, including at least 3 courses from within one concentration and at least 1 lab course</td>
<td></td>
</tr>
</tbody>
</table>

**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

**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
KNES445  Exercise and Brain Health
NEUR379  (Neuroscience Research: Behavioral and Cognitive)
NEUR479  (Neuroscience Research Lab; BSCI399(H, L) may be substituted with permission)
PHIL202  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  Science of Sleep and Biological Rhythms
PSYC442  Psychology of Language
PSYC455  Cognitive Development
PSYC489  Advanced Special Topics in Psychology (PSYC489G: Hormones & Behavior)

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.

**Four Year Plan**
Click here (https://cmns.umd.edu/undergraduate/advising-academic-planning/academic-planning/four-year-plans/four-year-plans-gened/) for roadmaps for four-year plans in the College of Computer, Mathematical, and Natural Sciences.

Additional information on developing a four-year academic plan can be found on the following pages:

- 4yearplans.umd.edu (http://4yearplans.umd.edu/)
- the Student Academic Success-Degree Completion Policy (https://academiccatalog.umd.edu/undergraduate/registration-academic-requirements-regulations/academic-advising/) section of this catalog