NEUROSCIENCE MAJOR (BSOS)

Program Director: Hilary Bierman, Ph.D.

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 scientific research and the culture(s) in which it is embedded.

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>
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<tbody>
<tr>
<td>NEUR Required Courses</td>
<td></td>
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<tr>
<td>NEUR200</td>
<td>Introduction to Neuroscience ((GenEd: NS) Introduction to Neuroscience)</td>
<td>3</td>
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<tr>
<td>NEUR305</td>
<td>Neural Systems and Circuits (Neuroscience Fundamentals I)</td>
<td>3</td>
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<tr>
<td>NEUR306</td>
<td>Cellular and Molecular Neuroscience (Neuroscience Fundamentals II)</td>
<td>3</td>
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<tr>
<td>NEUR405</td>
<td>(Neurobiology Lab)</td>
<td>4</td>
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<tr>
<td>Required Supporting Courses</td>
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<tr>
<td>MATH135 or MATH140</td>
<td>Discrete Mathematics for Life Sciences</td>
<td>4</td>
</tr>
<tr>
<td>MATH136 or MATH141</td>
<td>Calculus I</td>
<td>4</td>
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<tr>
<td>STATISTICS</td>
<td>BIOM301, EPB300, PSYC200, STAT400, or STAT464</td>
<td>3</td>
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<tr>
<td>BSCI170 &amp; BSCI171</td>
<td>Principles of Molecular &amp; Cellular Biology and Principles of Molecular &amp; Cellular Biology Laboratory</td>
<td>4</td>
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<tr>
<td>BSCI160 &amp; BSCI161</td>
<td>Principles of Ecology and Evolution and Principles of Ecology and Evolution Lab</td>
<td>4</td>
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<tr>
<td>CHEM131 &amp; CHEM132</td>
<td>Chemistry I - Fundamentals of General Chemistry and General Chemistry I Laboratory</td>
<td>4</td>
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<tr>
<td>CHEM231 &amp; CHEM232</td>
<td>Organic Chemistry I and Organic Chemistry Laboratory I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM241 &amp; CHEM242</td>
<td>Organic Chemistry II and Organic Chemistry Laboratory II</td>
<td>4</td>
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</table>
CHEM271 & CHEM272
General Chemistry and Energetics
and General Bioanalytical Chemistry Laboratory

PHYS131 or PHYS141
Fundamentals of Physics for Life Sciences I
or Principles of Physics

PHYS132 or PHYS142
Fundamentals of Physics for Life Sciences II
or Principles of Physics

PSYC100
Introduction to Psychology

UNIV100
The Student in the University (or equivalent)

Concentration Courses 1,2 16-20

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

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

BSCI444
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

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

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://bsosundergrad.umd.edu/advising/four-year-academic-plans/) for roadmaps for four-year plans in the College of Behavioral and Social 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