

NEUROSCIENCE MAJOR (BSOS)

NOTICE OF ADDENDUM: THE REQUIREMENTS FOR THIS PROGRAM WERE UPDATED EFFECTIVE SPRING 2023 AND HAVE BEEN PUBLISHED ON THE SPRING 2023 ADDENDUM TAB. FOR ADDITIONAL INFORMATION, SEE ADDENDA TO THIS CATALOG (<https://academiccatalog.umd.edu/undergraduate/addenda/>).

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 BSCI105) and BSCI160 AND BSCI161 (formerly BSCI106) 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. Demonstrate a knowledge base in the field of neuroscience and supporting disciplines.
2. Describe the current techniques and strategies in neuroscience research.
3. Demonstrate competence in scientific reasoning and critical thinking.
4. Demonstrate effective professional scientific communication skills.
5. Describe 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. Students will be able to demonstrate how neuroscience research has been used to oppress and marginalize groups through history and how it might be used to mitigate disparities.

6. Demonstrate an appreciation of possible career paths available to students proficient in neuroscience.

REQUIREMENTS

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Course	Title	Credits
NEUR Required Courses		
NEUR200	Introduction to Neuroscience	3
NEUR305	Neural Systems and Circuits	3
NEUR306	Cellular and Molecular Neuroscience	3
NEUR405	Neuroscience Laboratory (Neurobiology Lab)	3
Required Supporting Courses		
MATH135	Discrete Mathematics for Life Sciences	4
or MATH140	Calculus I	
MATH136	Calculus for Life Sciences	4
or MATH141	Calculus II	
STATISTICS	BIOM301, EPIB300, PSYC200, STAT400, or STAT464	3
BSCI170 & BSCI171	Principles of Molecular & Cellular Biology and Principles of Molecular & Cellular Biology Laboratory	4
BSCI160 & BSCI161	Principles of Ecology and Evolution and Principles of Ecology and Evolution Lab	4
CHEM131 & CHEM132	Chemistry I - Fundamentals of General Chemistry and General Chemistry I Laboratory	4
CHEM231 & CHEM232	Organic Chemistry I and Organic Chemistry Laboratory I	4
CHEM241 & CHEM242	Organic Chemistry II and Organic Chemistry Laboratory II	4
CHEM271 & CHEM272	General Chemistry and Energetics and General Bioanalytical Chemistry Laboratory	4
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
Track Courses ^{1,2}		16-20
Complete at least 5 courses, including at least 3 courses from within one track and at least 1 lab course		
MOLECULAR, CELLULAR, AND PHYSIOLOGICAL TRACK ³		
BCHM463	Biochemistry of Physiology	

	or BCHM461 Biochemistry I
BSCI222	Principles of Genetics
	or HLSC322 Principles of Genetics and Genomics
BSCI330	Cell Biology and Physiology
	or BSCI330H
BSCI402	Genomics of Sensory Systems
BSCI403	Biology of Vision
BSCI410	Molecular Genetics
BSCI415	Molecular Genetics Laboratory
BSCI430	Developmental Biology
BSCI431	The Origin and Evolution of Nervous Systems
BSCI440	Mammalian Physiology
	or BSCI450 Mammalian Systems Physiology
BSCI441	Mammalian Physiology Laboratory
	or BSCI451 Mammalian Systems Physiology Laboratory
BSCI446	Neural Systems
BSCI452	Diseases of the Nervous System
KNES370	Motor Development
KNES462	Neural Basis of Human Movement
NEUR379	Special Topics: Research in Neuroscience (Neuroscience Research: Molecular and Cellular)
NEUR479	Advanced Research in Neuroscience (Neuroscience Research Lab; BSCI399(H, L) may be substituted with permission)
SPECIAL TOPICS	BSCI338 or BSCI339 when specifically approved. Check with your advisor.
BEHAVIORAL AND COGNITIVE TRACK ³	
BSCI360	Principles of Animal Behavior
BSCI401	Animal Communication
KNES385	Motor Control and Learning
KNES445	Exercise and Brain Health
NEUR379	Special Topics: Research in Neuroscience (Neuroscience Research: Behavioral and Cognitive)
NEUR479	Advanced Research in Neuroscience (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
PSYC403	Animal Behavior
PSYC404	Introduction to Behavioral Pharmacology
PSYC406	Neuroethology
PSYC407	Behavioral Neurobiology Laboratory
PSYC414	Science of Sleep and Biological Rhythms
PSYC300	Research Methods in Psychology Laboratory
PSYC417	Data Science for Psychology and Neuroscience Majors
BSCI407	Behavioral Genetics
BSCI355	(Neurobiology of Extraordinary Senses)
PSYC310	Perception
PSYC442	Psychology of Language
PSYC455	Cognitive Development

PSYC489	Advanced Special Topics in Psychology (PSYC489G: Hormones & Behavior)
PSYC489	Advanced Special Topics in Psychology (When specially approved. Check with your advisor)
BSCI407	Behavioral Genetics
PSYC417	Data Science for Psychology and Neuroscience Majors
PSYC300	Research Methods in Psychology Laboratory
BSCI399	Biology Department Research (BSCI399D Biology of Chemosensory Systems)

Total Credits **75-79**

¹ Three pre-approved Neuroscience Research credits can be applied to the major as one course equivalent. One a single Research course equivalent can be applied to the major.

² Four 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.

FOUR YEAR PLAN

Click here (<https://fellercenter.umd.edu/academic-advising/forms-policies/graduation-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

SPRING 2023 ADDENDUM

NOTICE OF ADDENDUM: THE REQUIREMENTS LISTED BELOW ARE EFFECTIVE AS OF SPRING 2023. TO VIEW PRIOR REQUIREMENTS, SEE THE REQUIREMENTS TAB. FOR ADDITIONAL INFORMATION, SEE ADDENDA TO THIS CATALOG (<https://academiccatalog.umd.edu/undergraduate/addenda/>).

Requirements (effective Spring 2023)

Course	Title	Credits
NEUR Required Courses		
NEUR200	Introduction to Neuroscience	3
NEUR305	Neural Systems and Circuits	3
NEUR306	Cellular and Molecular Neuroscience	3
NEUR405	Neuroscience Laboratory (Neurobiology Lab)	3
Required Supporting Courses		
MATH135	Discrete Mathematics for Life Sciences	4
	or MATH140	Calculus I
MATH136	Calculus for Life Sciences	4
	or MATH141	Calculus II
STATISTICS	BIOM301, EPIB315, PSYC200, STAT400, or STAT464	3

BSCI170 & BSCI171	Principles of Molecular & Cellular Biology and Principles of Molecular & Cellular Biology Laboratory	4
BSCI160 & BSCI161	Principles of Ecology and Evolution and Principles of Ecology and Evolution Lab	4
CHEM131 & CHEM132	Chemistry I - Fundamentals of General Chemistry and General Chemistry I Laboratory	4
CHEM231 & CHEM232	Organic Chemistry I and Organic Chemistry Laboratory I	4
CHEM241 & CHEM242	Organic Chemistry II and Organic Chemistry Laboratory II	4
CHEM271 & CHEM272	General Chemistry and Energetics and General Bioanalytical Chemistry Laboratory	4
PHYS131 or PHYS141 or PHYS161	Fundamentals of Physics for Life Sciences I Principles of Physics General Physics: Mechanics and Particle Dynamics	4
PHYS132 or PHYS142 or PHYS260	Fundamentals of Physics for Life Sciences II ¹ Principles of Physics General Physics: Vibration, Waves, Heat, Electricity and Magnetism	4
PSYC100	Introduction to Psychology	3
UNIV100	The Student in the University (or equivalent)	1
Track Courses ^{2,3}		16-20
Complete at least 5 courses, including at least 3 courses from within one track and at least 1 lab course		
MOLECULAR, CELLULAR, AND PHYSIOLOGICAL TRACK ⁴		
BCHM463 or BCHM461	Biochemistry of Physiology Biochemistry I	
BSCI222 or HLSC322	Principles of Genetics Principles of Genetics and Genomics	
BSCI330	Cell Biology and Physiology	
BSCI343	Cellular Mechanisms of Aging and Disease	
BSCI357	Neurobiology of Chemosensory Systems	
BSCI381	Molecular Neuroethology	
BSCI402	Genomics of Sensory Systems	
BSCI403	Biology of Vision	
BSCI410	Molecular Genetics	
BSCI415	Molecular Genetics Laboratory	
BSCI430	Developmental Biology	
BSCI431	The Origin and Evolution of Nervous Systems	
BSCI440 or BSCI450	Mammalian Physiology Mammalian Systems Physiology	
BSCI441 or BSCI451	Mammalian Physiology Laboratory Mammalian Systems Physiology Laboratory	
BSCI446	Neural Systems	
BSCI452	Diseases of the Nervous System	
BSCI456	Advanced Cellular Neuroscience	
KNES370	Motor Development	
KNES462	Neural Basis of Human Movement	
NEUR379	Special Topics: Research in Neuroscience	
NEUR479	Advanced Research in Neuroscience (Neuroscience Research Lab; BSCI399(H, L) may be substituted with permission)	

SPECIAL TOPICS: BSCI338 or BSCI339 when specifically approved. Check with your advisor.	
BEHAVIORAL AND COGNITIVE TRACK ⁴	
BSCI355	(Neurobiology of Extraordinary Senses)
BSCI360	Principles of Animal Behavior
BSCI401	Animal Communication
BSCI407	Behavioral Genetics
KNES385	Motor Control and Learning
KNES445	Exercise and Brain Health
PHIL202	Know Thyself: Wisdom Through Cognitive Science
PHIL366	Philosophy of Mind
PSYC300	Research Methods in Psychology Laboratory
PSYC302	Fundamentals of Learning and Behavior
PSYC341	Introduction to Memory and Cognition
PSYC403	Animal Behavior
PSYC404	Introduction to Behavioral Pharmacology
PSYC406	Neuroethology
PSYC407	Behavioral Neurobiology Laboratory
PSYC414	Science of Sleep and Biological Rhythms
PSYC417	Data Science for Psychology and Neuroscience Majors
PSYC442	Psychology of Language
PSYC455	Cognitive Development
NEUR379	Special Topics: Research in Neuroscience (Research in Neuroscience)
NEUR479	Advanced Research in Neuroscience (Neuroscience Research Lab; BSCI399(H, L) may be substituted with permission)
SPECIAL TOPICS: PSYC489 or BSCI339 when specifically approved. Check with your advisor.	

Total Credits **75-79**

¹ PHYS260 must be taken with PHYS261 to earn 4 credits

² Three pre-approved Neuroscience Research credits can be applied to the major as one course equivalent. One a single Research course equivalent can be applied to the major.

³ Four pre-approved NEUR479 credits in the same faculty research laboratory can satisfy the lab requirement.

⁴ Courses may be occasionally added or removed from this list. Not all courses may be available each semester.