Neuroscience and Behavior Major

Admission to the Major

One or more of the foundation courses in biology (BIOL181, BIOL182) are prerequisites for the advanced NS&B courses offered by the Biology Department. Although not legislated as prerequisites, NS&B213 and NS&B laboratory courses provide important conceptual and practical background for independent research in the junior and senior years. The ideal course sequence would include BIOL181 and BIOL182 along with chemistry in the first year. In the sophomore year, one would take NS&B213. The other required courses and research tutorials would be spread out over the last two years. For information on the pathway through the major, please visit wesleyan.edu/nsb/pathways.html for further information.

To be admitted to the major during March of the sophomore year, a student must have completed, with grades of C- or better, at least two of the full-credit courses listed in foundation and core courses that follow. At least one of these credits must be either NS&B213 or BIOL181.

Foundation Requirements

- BIOL181 Principles of Biology I
- BIOL191 Principles of Biology I-Laboratory
- BIOL182 Principles of Biology II
- BIOL192 Principles of Biology II-Laboratory
- CHEM141/CHEM142 Introductory Chemistry I/II or CHEM143/CHEM144 Principles of Chemistry I/II
- CHEM251/CHEM252 Principles of Organic Chemistry I/II
- Two additional courses from the following (beginning with the graduating class of 2016):
  - Physics (PHYS111 or PHYS112 or PHYS113 or PHYS116)
  - Psychology (PSYC105)
  - Mathematics (MATH117 or higher); and/or
  - Computer science (COMP112 or higher)

Core Course

- NS&B213 Behavioral Neurobiology

Advanced Courses

Five advanced courses from the following list are required for students; two must be cross-listed with biology; two cross-listed with psychology; and one, a research tutorial or methodological course. Some courses appear in both Biology and Psychology lists but may be counted only once, in either category.

Cross-listed with biology

- NS&B224 Hormones, Brain, and Behavior
- NS&B239 Functional Anatomy of the Human Brain*
- NS&B245 Cellular Neurophysiology

Cross-listed with psychology

- NS&B252 Cell Biology of the Neuron
- NS&B254 Comparative Animal Behavior
- NS&B299 Waves, Brains, and Music
- NS&B303 Receptors, Channels, and Pumps: Advanced Topics in Membrane Protein Structure and Function
- NS&B317 Neuroethics
- CHEM323/NS&B323 Biochemistry of Neurodegenerative Disease
- NS&B325 Stem Cells: Basic Biology to Clinical Application
- NS&B328 Chemical Senses
- NS&B343 Muscle and Nerve Development
- NS&B345 Developmental Neurobiology
- NS&B347 Mammalian Cortical Circuits
- NS&B351 Neurobiology of Learning and Memory
- NS&B357 (https://owaprod-pub.wesleyan.edu/reg/lwesmaps_page.html?stuid=&facid=NONE&crse=015539&term=1199) Sex and Gender: From Synapse to Society
- NS&B353 Neurobiology of Neurological Disorders*
- NS&B356 Neurodevelopmental Disorders*
- NS&B360 Neuroplasticity: How Experience Changes the Brain

Research methods and practica

- BIOL320 Quantitative Methods for the Biological and Environmental Sciences
- MATH132 Elementary Statistics
- NS&B210 Research Methods in Cognition
- NS&B215 Research Methods: Behavioral Methods in Animal Research
- NS&B243 Neurohistology
- NS&B247 Laboratory in Neurophysiology
- NS&B250 Laboratory in Cellular and Behavioral Neurobiology
- NS&B280 Applied Data Analysis
- NS&B383 Advanced Research in Learning and Memory
- NS&B390 Experimental Investigations into Reading
- NS&B392 Behavioral Methods in Affective Neuroscience
- NS&B398 Advanced Research in Auditory Cognitive Neuroscience
- NS&B399 Lab in Gambling, Drugs, and Junk Food
• NS&B409/NS&B410 Senior Thesis Tutorial or NS&B423/NS&B424 Advanced Research Seminar for two semesters, both in the lab of the same faculty member
• PSYC200 Statistics: An Activity-Based Approach

Note: MATH132 can be taken to meet requirements for either the methodological or foundation major requirements, but not both. Methodological courses cannot be credited toward the requirements of advanced courses cross-listed with biology or psychology. *Courses listed in both categories A. or B. can be counted only in A. or B. but not both.

Courses of relevance outside the program. Though not requirements of the major, students should be aware that courses in organic chemistry and molecular biology, as well as courses in non-neuroscience areas of biology and psychology, complement the NS&B major and should be considered, in consultation with your advisor, when planning your program of study.

SUBSTITUTING OUTSIDE COURSES FOR CREDIT TO THE MAJOR

Foundation courses: A student who has taken foundation courses outside of Wesleyan may be able to apply them to the major. As a general rule, courses acceptable to the biology, chemistry, and physics departments for university credit are acceptable to the NS&B program for substitution for foundation courses.

Advanced courses: Advanced courses, inside or outside of the University, might be acceptable as substitutes for the advanced courses of the NS&B major. In general, only one such course can be substituted; and approval must be obtained in advance from the program director.

UNDERGRADUATE RESEARCH

NS&B majors are encouraged to become involved in the research of the faculty. Research tutorials and senior thesis tutorials are taken with mode of grading and amount of credit to be arranged with the research supervisor. Research tutorials are numbered NS&B411/NS&B412, NS&B409/NS&B410, and NS&B423/NS&B424. These courses can fulfill the research methods requirement or can receive graduate credit. For the most up-to-date information on NS&B faculty research, please visit our department website (http://www.wesleyan.edu/nsb).

STUDENT LEARNING GOALS

Our program offers a curriculum that encourages fluency across multiple disciplines in the field of neuroscience and behavior. Immersion in this field requires thinking across multiple levels of analysis and an appreciation for how complex and broad questions can be made amenable to scientific inquiry. In terms of goals, we have three areas of knowledge that we expect all students to acquire by the time they have completed the NS&B major:

• Structure: The parts and how they connect. Structural knowledge includes neural development, neuroanatomy, neurotransmitters, and the cell and molecular biology of the neuron.
• Function: How the parts come together to produce systems. Such systems include various sensory, motor, and neuroendocrine systems. Knowledge concerning function is gained by studies of structures and studies of perception, learning and memory, behavior, and cognition.
• Theory: Governing principles that can be proposed from all the above. Examples of theories include those that address the relationships between brain and behavior, articulate how brain structure and function changes over time, and explain cognitive and perceptual processes.

In addition, it is our goal that all students can skillfully apply and analyze knowledge gained from their studies. Statistics courses, lab-based methods courses, and/or direct experience in research projects serve this goal.

ADVANCED PLACEMENT

AP credit may be used to place out of any of the foundation courses, subject to the guidelines of the department hosting these courses.

PRIZES

George H. Acheson and Grass Foundation Prize in Neuroscience: Established in 1992 by a gift from the Grass Foundation, this prize is awarded to an outstanding undergraduate in the Neuroscience and Behavior Program who demonstrates excellence in the program and who also shows promise for future contributions in the field of neuroscience.

BA/MA PROGRAM

This program provides an attractive option for science majors to enrich their course and research background. Students are advised to begin research by their junior year if they intend to pursue the BA/MA. Admission is competitive and based on GPA, faculty recommendations, and research experience. For more information, please visit https://catalog.wesleyan.edu/departments/nsb/grad-programs/bama.html.

ADDITIONAL INFORMATION

• Teaching apprenticeships. Students may be appointed teaching apprentices with the approval of the participating faculty member and the Office of Academic Affairs. The apprenticeship position involves assisting a faculty member in the teaching of a course. Concurrently, the apprentice enrolls in an apprenticeship tutorial (NS&B491/NS&B492) that is usually a one-credit course and operates in either the graded or credit/no credit mode.
• Petitioning for exemptions. A student may request a variance from the requirements of the major or for honors by submitting a written petition to the chair of the program. The petition should indicate why the requirement cannot be met and the educational justification for the alternative. The petition will be considered by the NS&B faculty, and the student will receive a statement of the decision by letter.
• Seminars. The program periodically invites neuroscientists from outside Wesleyan to come here and describe their research. These seminars frequently complement course material and give students the opportunity to interact with noted researchers. The talks are usually scheduled for noon on Thursdays. Students are encouraged to attend.

HONORS

To be considered for honors, a student must be an NS&B major and have a B average (grade average 85) in the courses credited to the major. The student

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must submit a laboratory research thesis that was supervised by a member of the NS&B faculty and be recommended for honors by the NS&B faculty.