

NEUROSCIENCE & BEHAVIOR

415P Millbank

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Mission

The Neuroscience and Behavior major provides a strong background in the neural underpinnings of behavior and cognition. It is intended for students who plan to pursue a research career in neuroscience or a related discipline. Students electing this major are exposed to basic courses in biology, psychology and statistics, and to advanced courses in neuroscience and behavior.

Student Learning Outcomes

Upon successfully completing the major, students should have the ability to:

- discuss neuroscience phenomena from many different levels of organization (e.g., explain how the destruction of myelin in people with multiple sclerosis leads to cognitive and motor deficits);
- describe the basic features of nervous system development, organization, signaling, integration, and higher-level processing;
- explain the neural basis of sensory-motor integration, learning and the generation of complex behaviors;
- conceive of, implement, and present an original research project;
- generate a testable hypothesis and develop a controlled experimental design;
- perform modern scientific measurement techniques;
- write an original research paper.

Programs of Study

Barnard Neuroscience and Behavior department offers a major. The major requirements are listed on the [department website](#).

Student Advising

Advising Resources

- The [department website](#) provides a comprehensive and detailed overview of the Neuroscience and Behavior major as well as of the neuroscience courses available to Barnard students. The Program Planning meeting the department holds each semester offers students an opportunity to learn about our major and the department's resources. For specific questions about the major or the department, students can contact the department chair or the department representative.
- Each Neuroscience and Behavior major is assigned a **major advisor** who is a member of the Neuroscience and Behavior faculty. Majors meet regularly with their major advisor to receive guidance on course selection, research project, and post-graduation careers.

Guidance for First-Year Students

Introduction to Neuroscience is the course we recommend for first-year students. It provides foundational knowledge on the core aspects of the discipline and is a prerequisite for our more advanced courses. It is offered in fall and spring semesters.

Enrollment in Courses

Many of the courses required by the Neuroscience and Behavior major have **Introduction to Neuroscience** as a prerequisite.

Preparation for Graduate Study

Major advisors provide guidance on graduate studies and other career paths related to neuroscience. Every year the department organizes multiple meetings to highlight careers open to neuroscience majors.

Coursework Taken Outside of Barnard

Advanced Placement Credit

Our department does not grant major credit or exemption for AP exam scores.

Columbia College Courses

- Only approved Columbia University courses can be taken to fulfill our major. The list of approved courses is available on the department webpage.
- All Neuroscience and Behavior majors must take five core neuroscience courses that provide foundational knowledge and laboratory training. Up to two of the five core neuroscience courses may be taken outside Barnard's Neuroscience and Behavior department. Outside classes include those taken at Columbia or at other universities. The list of core neuroscience courses is presented on the [department website](#).

Transfer Credit

- When students transfer to Barnard from other institutions, their coursework is first evaluated for college elective credit by the Registrar's Office. If approved, the Neuroscience and Behavior department can consider these courses for credit toward its major.
- Our department representative has to approve if a neuroscience course taken outside Barnard College or Columbia University counts toward the major. Students are required to contact the department representative for approval of transfer credit.
- No more than two of the five core neuroscience courses can be transferred from other institutions. The list of core neuroscience courses is presented on the department website.
- For detailed information about transfer credit, please consult the [department webpage](#).

Study Abroad Credit

- Classes taken abroad through Columbia-led programs (i.e., those administered by Columbia's Center for Global Engagement) are treated as Columbia courses, equivalent to those taken on the Morningside Heights campus.
- Classes taken abroad through other institutions or programs are treated as transfer credit and are subject to the same policies as other transfer courses. Accordingly, there will be a limit on the number of study abroad courses that can be counted toward the major or minor.
- To receive credit toward the major or minor for a study abroad course (whether taken through a Columbia program or another institution/program), students must submit a Study Abroad Approval form through Slate and obtain the approval of the chair or departmental representative.

Summer Credit

- Summer courses at Barnard are equivalent to those taken during the academic year. Courses that have been approved for the fulfillment of departmental requirements will automatically count toward the major.
- Courses taken at other institutions (including Columbia) are considered transfer credit and are subject to the same policies governing other transfer courses. To receive credit for a summer course taken at another institution, students must submit a Summer Course form through Slate and have it approved by both the Registrar's Office and the department representative.

Research Methods in Neuroscience and the Senior Capstone Project

Coursework in Research Methods

Students may participate in supervised research projects as part of the Independent Study course that our faculty offer every semester. Detailed information about the Independent Study course is available on the [department webpage](#).

The Senior Capstone Project

The senior thesis offers Neuroscience and Behavior majors a unique opportunity to conduct their own research project and gain a deeper understanding of scientific research. Students apply the knowledge they have acquired in multiple courses to conduct an original empirical study. By working on their own project, students learn first-hand how to design and execute experimental research. During their final full year, Neuroscience and Behavior majors must complete two semesters of research and seminars. They can choose among **two thesis options** that differ primarily on whether students conduct their own research project in a lab or as part of a course. For more information about the senior thesis, please visit the [department webpage](#).

Other Research Opportunities

Most of our students conduct research projects in neuroscience laboratories in the New York area as part of their Senior Thesis, the Summer Research Institute, and/or the Independent Study course. Students are encouraged to secure a position in a research laboratory so they may gain valuable experience prior to embarking on their senior thesis project. Students with a lab position may apply to the Summer Research Institute and/or earn academic credit for independent study.

Departmental Honors and Prizes

Departmental Honors

Departmental Honors are awarded to students who show excellence in learning and research.

Academic Prizes

Our department confers the following academic prizes to Barnard students in recognition of outstanding achievements in learning, research, and dissemination of scientific knowledge:

- The Capstone Prize for Distinguished Achievement in Neuroscience
- The Foundations of Neuroscience Prize for Outstanding Research Achievement
- The Synapse Prize for Contribution to Barnard Neuroscience and Behavior Community

- The Neuron Prize for Distinguished Accomplishment in Neuroscience
- The Young Scholar Prize for Outstanding Research Project
- The Faculty Recognition Prize for Excellence in Neuroscience
- The Spirit of Inquiry Prize for Distinguished Achievement in Neuroscience
- The Christina L. Williams Prize for Original Research Publication in Neuroscience

Chair

Peter Balsam (Samuel R. Milbank Professor)

Professors

Elizabeth Bauer (Chair, Biology)

BJ Casey (The Christina L. Williams Professor of Neuroscience)

John Glendinning (Associate Chair, Biology; Ann Whitney Olin Professor of Biological Sciences)

Russell Romeo

Rae Silver (Helene L. and Mark N. Kaplan Professor of Natural and Physical Sciences)

Assistant Professors

Gabrielle Gutierrez

Alex White

Senior Lecturers

Kara Pham (Departmental Representative)

Lecturers

E'mett O. McCaskill

Term Assistant Professors

Anamaria Alexandrescu

Luca Iemi

Abigail Zadina

Post-Doctoral Fellows

Vassiki Chauhan

Amanda Gonzalez-Segarra

Aishwarya Iyer

Yen-Chu Lin

Adjunct Associate Professors

Kevin Bath

William Fifer

Ari Shechter

Adjunct Assistant Professors

Morgan R. Firestein

Major Requirements

The new NSBV curriculum requires the completion of a minimum of 13 courses (5 core neuroscience courses; 3 introductory courses from cognate disciplines; 3 elective courses; a year-long research seminar counting as 2 courses) and a senior thesis. All NSBV majors must take 5 core neuroscience courses that provide foundational knowledge and laboratory training. No more than 2/5 core neuroscience courses can be taken outside the NSBV Department, including Columbia University or other institutions. For many courses, NSBV majors have multiple options. Reflecting the interdisciplinary nature of our discipline, students can select introductory and elective courses offered in other departments either at Barnard or Columbia. Furthermore, students have the option of selecting elective courses in one suggested track – cognitive/behavioral, computational, or molecular.

Five Core Neuroscience Courses

NSBV BC1001	INTRODUCTION TO NEUROSCIENCE
NSBV BC2001	LABORATORY IN NEUROSCIENCE
NSBV BC3001	SYSTEMS AND BEHAVIORAL NEUROSCIENCE
BIOL BC3362	MOLECULAR # CELLULAR NEUROSCIENCE
NSBV BC2002	STATISTICS AND EXPERIMENTAL DESIGN

Three Introductory Courses from Other Disciplines

One course must be Introduction to Cellular and Molecular Biology (BIOL BC1502 + lab BIOL BC1503); the other courses (1lect; 1lect+lab) from cognate disciplines (Biology, Chemistry, Computer Science, Physics, or Psychology)

Senior Research Seminar

Seniors can choose among two options: Senior Research Seminar (NSBV BC3593-4) and Neuroscience Guided Research (NSBV BC3591-2)

Three Elective Courses

Approved electives are listed on the [department webpage](#). One elective course must be a 3000-level seminar.

Fall 2024

NSBV BC1001	INTRODUCTION TO NEUROSCIENCE
NSBV BC2001	LABORATORY IN NEUROSCIENCE
NSBV BC2002	STATISTICS AND EXPERIMENTAL DESIGN
NSBV BC2004	Fundamentals in Computational Neuroscience Models
NSBV BC3376	PSYCHOBIOLOGY OF INFANT DEVELOPMENT
NSBV BC3386	THE NEURAL CODE
NSBV BC3387	TOPICS IN NEUROETHICS
NSBV BC3388	MODELS OF NEUROPSYCHIATRIC DISORDERS
NSBV BC3389	Hallucinations, illusions, dreaming and imagination
NSBV BC3392	PSYCHOBIOLOGY OF STRESS
NSBV BC3393	HOW WE LEARN: AN EDUCATIONAL NEUROSCIENCE PERSPECTIV
NSBV BC3591	NEUROSCIENCE GUIDED RESEARCH

NSBV BC3593	RSRCH/SEM-NEUROSCNCE#BEHAVIOR
NSBV BC3099	INDEPENDENT STUDY

Spring 2025

NSBV BC1001	INTRODUCTION TO NEUROSCIENCE
NSBV BC2001	LABORATORY IN NEUROSCIENCE
NSBV BC3001	SYSTEMS AND BEHAVIORAL NEUROSCIENCE
NSBV BC3361	CELLULAR # MOLECULAR NEUROSCIENCE
NSBV BC3387	TOPICS IN NEUROETHICS
NSBV BC3398	PSYCHOBIOLOGY OF SLEEP
NSBV BC3405	NEUROSCIENCE OF TRAUMA
NSBV BC3385	NEUROETHOLOGY
NSBV BC3592	NEUROSCIENCE GUIDED RESEARCH
NSBV BC3594	RSRCH/SEM-NEUROSCNC#BEHAVIOR
NSBV BC3099	INDEPENDENT STUDY

Past Courses

(Courses not offered in Fall '24 and Spring '25)

NSBV BC2006	MIND/BRAIN DISORDERS
NSBV BC2154	HORMONES AND BEHAVIOR
NSBV BC3377	Adolescent Neurobehavioral Development
NSBV BC3384	RHYTHMS OF THE BRAIN
NSBV BC2003	Neuroendocrinology of Stress
NSBV BC2005	FLAVOR PERCEPTION AND THE HUMAN DIET
NSBV BC2008	ADAPTIVE OR ARRESTED DEVELOPMENT OF THE ADOLESCENT BRAIN
NSBV BC3105	Neuroimmunology Seminar
NSBV BC3394	Neurobiology of Social Behaviors