The Department of **Neurobiology and Behavior**

**Chairperson**
Alfredo Fontanini, Life Sciences Building 573, (631) 632-4100

**PhD Graduate Program Director**
Arianna Maffei, (631) 632-8644, Arianna.Maffei@stonybrook.edu

**MS Graduate Program Director**
Howard Sirotkin, Life Sciences Building 512, (631) 632-4818

**PhD Administrator**
Odalis Hernández, Life Sciences Building 573, 631-632-8078, FAX (631) 632-6661

**Degrees Awarded**
PhD in Neuroscience, MA in Biological Sciences and MS in Biomedical Science (Neuroscience track)

**PhD Program**
https://www.stonybrook.edu/commcms/neurobiology/graduate-program/phd-program/

**Master’s Program**
https://www.stonybrook.edu/commcms/neurobiology/graduate-program/ms-program/

**Description of the Program in Neuroscience**

The Graduate Program in Neuroscience, in the College of Arts and Sciences and the Renaissance School of Medicine, offers doctoral training toward a Master’s degree or a Doctoral degree in the rapidly expanding field of neuroscience. Through coursework and independent research, students are trained to approach research problems in neuroscience with a broad perspective. Program faculty have expertise in the areas of molecular and biochemical control of development, properties physiology and cellular/molecular properties of receptors and ion channels in relation to cellular physiology, analysis of local circuits and networks, behavioral neuroscience the cellular basis of integrative functions, theoretical and computational neuroscience and the structural basis for communication among neurons are available to all students in the program. Graduate students will receive in-depth research training in molecular, biochemical, physiological, behavioral, or anatomical and theoretical/computational neurosciences. In addition, the Program offers unique opportunities to draw from one or more of these disciplines through multidisciplinary, cosponsored/comentored research projects. A program of highly interactive faculty and students provides an exciting focus for research training. Communicate Neuroscience research. Students will be exposed to advanced neuroscience research techniques, approaches and theory culminating with the MS degree. Core concepts and skills are taught through a series of required core courses, with the remaining coursework consisting of advanced electives and special topics courses. Expertise in the areas of molecular and biochemical control of development, properties of receptors and ion channels in relation to cellular physiology, the cellular basis of integrative functions, computational neuroscience and the structural basis for communication among neurons are available to all students in the program. Students will receive in-depth research training in molecular, biochemical, physiological, behavioral, computational or anatomical sciences. A program of highly interactive faculty and students provides an exciting focus for research training.

**Admission details for the Department of Neurobiology and Behavior**

Students are expected to fulfill basic requirements of the Graduate School: a bachelor’s degree from a recognized university, a grade point average corresponding to B or higher, and the recommendations of three former instructors. In addition, all non-native speakers of English must score a minimum of 600 (paper), 250 (computer) or 100 (iBT) on the Test of English as a Foreign Language (TOEFL). The Program in Neuroscience has the following additional requirements: one year of calculus, physics, and chemistry, demonstrated proficiency in biological sciences, and laboratory research experience. Deficiencies in these requirements do not preclude admission, and special consideration will be made to promising applicants.

**Application Deadline:** March 15 for MS applications, January 15 for PhD applications

Applicants do not need to send their official transcripts until they are offered admission into the program.

In addition to the minimum requirements of the Graduate School, the following are suggested requirements:
A. BS or BA degree in a life science related field, with a minimum undergraduate grade point average of 3.00.

*Pre-requisites:* Successful MS and PhD candidates have often completed college level courses in physics, mathematics, organic and inorganic chemistry and advanced biology. It is recommended that students will have undergraduate neuroscience coursework. However, students are also accepted into the program without all necessary pre-requisites. These students may be asked to take the appropriate preparation course(s) prior to undertaking specific graduate level courses.

B. Three letters of recommendation.

C. Personal statement.

Facilities of the Department of Neurobiology and Behavior

Program faculty are located in the Life Sciences Building, the Psychology Building, Centers for Molecular Medicine, and Health Sciences Center on the SUNY Stony Brook campus, and at Brookhaven National Laboratory and the Cold Spring Harbor Laboratory. Molecular facilities provide for analysis of protein and DNA biochemistry, including microsequencing, peptide mapping, synthesis of oligonucleotides and peptides, cellular transfection, and production of transgenic animals. Wide-ranging facilities for cellular and integrative electrophysiology exist for studies on dissociated neurons, brain slice preparations, neurons in situ, and genetically engineered cells in culture. Imaging facilities permit anatomical reconstruction, fluorescence measurements, and the use of ion-sensitive indicators on both conventional, confocal, and multi-photon microscopes. An image analysis core is linked to a scanning and transmission electron microscopy facility. Separate behavioral testing core facilities for mice and rats are also available.

Requirements for Admission

The Graduate Program in Neuroscience does not accept a student whose goal is a M.A. degree. In exceptional instances, a student already in the Program may be awarded a M.A. degree upon completion of an approved course of study, including 30 graduate credit hours, a comprehensive examination, a research thesis, and the minimum requirements of the Graduate School.

Requirements for the PhD in Neuroscience

A. Course Requirements

1. Core courses in neuroscience (BNB 561, BNB 562, BNB 563, BNB 564). A four-semester series taught by members of the Program; the student is introduced to a broad variety of topics. These will be taken in the Fall and Spring semesters of the first and second years.

2. Neuroanatomy (BNB 560), Developmental Neuroscience (BNB 565), and Neurobiology of Disease (BNB 566). These are required short courses elaborating on fundamental topics in Neuroscience.

3. Laboratory Rotations in Neuroscience (BNB 555). A two-semester course in the Fall and Spring semesters of the first year. Students conduct research rotations in laboratories of three program members and present oral reports on their research.

4. Writing Neuroscience (BNB 551). This course is taught in the Fall semester of the first year. It provides training in the basics of scientific communication, with a strong emphasis on writing and revision. Practical exercises are designed to give experience and feedback in commonly needed aspects of scientific writing.

5. Advanced Neurobiology and Behavior Seminar (BNB 697). Seminar presentations delivered by faculty, students, associates, and visiting speakers.

6. Electives. At least two additional graduate-level courses in various biological, physical, or mathematical sciences must be selected by the student in consultation with the student’s advisor. Students may take additional elective courses if they desire.

B. Thesis Proposal

At the end of the second year of study, each student must successfully propose and defend an outline of their thesis research. The proposal consists of a written document and an oral presentation.

C. Advancement to Candidacy

The faculty will recommend a student to the Graduate School for advancement to candidacy upon satisfactory completion of all course requirements and passing their thesis proposal.

D. Student Seminars

All students who have advanced to candidacy are required to give a departmental seminar on their dissertation work annually.

E. Ph.D. Dissertation

A dissertation that constitutes an original and significant contribution to the field of neuroscience is required for the Ph.D. The work must be of a quality acceptable for publication in a recognized scientific journal. At the end of the first year, students initiate a dissertation research program in a Program faculty’s laboratory. After advancement to candidacy, the student and advisor will assemble an advisory committee to guide the dissertation research. Upon completion of the dissertation research, the student will present a seminar based on the dissertation. Following this the student will be given an oral examination on the dissertation research and related areas by the dissertation committee.

F. Teaching Requirements
To gain experience in teaching, the Program requires that all students serve as teaching assistants for two semesters during the first two years of study. Students who enter the program from the medical school’s MSTP program are required to serve as TA’s for one semester. Usually, TA assignments are to courses taught by Program faculty. Assignments are made to minimize impact on research productivity in the second year of study.

**G. Residence Requirement**
The University requires at least two consecutive semesters of full-time study. The demands of the course of study necessitate a longer period of residence.

**H. Academic Standing**
All students must maintain a 3.0 grade point average at all times. Due to the importance of BNB 561, BNB 562, BNB 563, and BNB 564 as the basis for advanced study in Neuroscience, students who have a grade of less than a B in these courses must remediate or repeat them satisfactorily prior to defending the thesis proposal and advancing to candidacy. Any student who fails to receive a grade of B or better in more than one required course will be reviewed for possible termination from the Program. Research (BNB 599 and BNB 699) is graded on a satisfactory/unsatisfactory basis. Any student who receives a grade of U in a research course will be reviewed for possible termination from the Program.

Requirements for the MA in Biological Sciences

Completion of this track will require 30 credits from the approved PhD curriculum in Neuroscience and a thesis.

Requirements for the MS in Biomedical Science

A total of at least 30 graduate credits with a cumulative GPA of 3.0 or greater are required for the MS degree. Of these, at least 8 credits must be earned in core courses in cellular, molecular and systems, and computational neuroscience. Students must also complete 4 credits in seminar courses designed to enhance reading, writing and presentation skills.

Research skills are at the center of the program and all students are required to complete a minimum of 14 credits of research related courses comprised of Introduction to Neuroscience Research, Neuroscience research practicum and Neuroscience Thesis work. Additional electives round out the remaining credit requirements. A research thesis is required at the culmination of the program.

**Core Curriculum:**

- **NEU 501:** Introduction to Neuroscience Research (Summer II, 3 credits)
- **NEU 502:** Reading, Writing and Speaking Neurobiology (Fall, 2 credits)
- **NEU 521:** Introduction to Cellular Neuroscience (Fall, 3 credits)
- **NEU 522:** Introduction to Molecular Neuroscience (Fall, 3 credits)
- **NEU 531:** Sensory and Motor Systems (Spring, 2 credits)
- **NEU 532:** Neural Plasticity, Learning and Memory (Spring, 2 credits)
- **NEU 536:** Introduction to Computational Neuroscience (Spring, 2 credits)
- **NEU 547:** Introduction to Neural Computation (Fall, 3 credits)
- **BNB 560:** Introduction to Mammalian Neuroanatomy (Spring, 1 credit)
- **BNB 567:** Statistics and Data Analysis in Neuroscience I: Foundations (Fall, 2 credits)
- **BNB 568:** Statistics and Data Analysis in Neuroscience II: Applications (Spring, 2 credits)
- **BNB 697:** Neuroscience Seminar Series (Fall, Spring, 1 credit)
- **NEU 548:** MS Research Practicum in Neuroscience (Fall, Spring, Summer, 0-9 credits)
- **NEU 549:** MS Thesis Research in Neuroscience (Fall, Spring, Summer, 0-6 credits)

*Students must complete at least 8 credits from NEU521, NEU522, NEU531, NEU532, NEU536 and BNB560.*

**Faculty in the Program in Neuroscience**

Stony Brook Faculty

Abi-Dargham, Anissa, MD, Neuropsychiatric disorders and addiction. Dept. of Psychiatry.

Acosta-Martinez, Maricedes, Ph.D., 2002, Albert Einstein College of Medicine: Neuroendocrine regulation of the hypothalamus-pituitary-gonad (HPG) axis. Dept. of Physiology and Biophysics


Brinkman, Braden, Ph.D., 2013, Physics, University of Illinois at Urbana-Champaign: Using Avalanche Statistics to Forecast Failure in Models of Earthquake Faults and Magnets
Canli, Turhan, Ph.D., Yale University: Interplay of environmental and genetic factors on individual differences in emotions, personality traits, social cognition, and mental health. Dept. of Psychology.


Colognato, Holly, Ph.D., 1999, Rutgers University: Molecular mechanisms that control oligodendrocyte function during nervous system development and during disease. Dept. of Pharmacology.

DeLorenzo, Christine, Ph.D., 2007, Yale University: Biomarkers of Major Depressive Disorder, Antidepressant Treatment Response, Prediction, Multimodal Brain Imaging, PET Radioligands. Dept. of Psychiatry.

Dill, Kenneth, Ph.D., UCSD, La Jolla: Properties of Proteins. Dept. of Chemistry.

Djuric, Petar, Ph.D., Signal analysis, modeling, and processing. Dept. of Electrical and Computer Engineering.

Dubnau, Josh, Ph.D., 1995, Columbia University: Genetic dissection of memory in Drosophila. Dept. of Anesthesiology.

Enikolopov, Grigori, PhD, Institute of Molecular Biology, USSR Academy of Sciences: Neurogenesis, stem cells, signal transduction.


Frohman, Michael, Ph.D., M.D., University of Pennsylvania: Regulation of exocytosis and cell shape by signaling proteins. Dept. of Pharmacology.

Ge, Shaoyu, Ph.D., 2002, University of Science and Technology of China: Development of new neurons in the adult brain. Dept. of Neurobiology and Behavior.

Halegoua, Simon, Ph.D., 1978, Stony Brook University: Neuronal Growth Factor Signaling and the Control of Phenotype and Survival. Dept. of Neurobiology and Behavior.

Kernan, Maurice, Ph.D., 1990, University of Wisconsin: Mechanosensory transduction in Drosophila; TRP channel function; ciliary mechanisms. Dept. of Neurobiology and Behavior.


La Camera, Giancarlo, Ph.D., 2003, University of Bern: Learning and decision making; Theoretical Neuroscience. Dept. of Neurobiology and Behavior.

Laughlin, Scott, Ph.D., 2008, University of California: Chemical strategies for deciphering neural circuitry. Dept. of Chemistry.

Lerner, Matthew, Ph.D., 2013, University of Virginia: Developmental psychopathological and neuropsychological models of social competence deficits. Dept. of Psychology.

Maffei, Arianna, Ph.D., 2002, University of Pavia (Italy): Experience-dependent plasticity of neocortical circuits. Dept. of Neurobiology and Behavior.

McKinnon, David, Ph.D., 1987, Australian National University: Evolution and robustness of electrophysiological systems. Dept. of Neurobiology and Behavior.

Mofakham, Sima, Ph.D., University of Michigan, Computational neuroscience of neurological disorders. Dept. of Neurosurgery.


Parsey, Ramin, Ph.D, University of Maryland at Baltimore: Depression, Dementia and brain imaging technologies such as Positron Emission Tomography. Dept. of Psychiatry.

Plotkin, Joshua, Ph.D., UCLA: Functional microcircuitry of the basal ganglia in normal and disease states. Dept. of Neurobiology and Behavior.

Puopolo, Michelino, Ph.D., University of Ferrara, Italy: Cellular neurophysiology of nociceptor (pain-sensing) neurons. Dept. of Anesthesiology.

Reissland, Markus, Ph.D., University of Cologne, Germany: Cellular senescence and its contribution to ageing and neurodegenerative disorders. Dept. of Neurobiology and Behavior.

Sher, Roger, Ph.D.: Cellular and molecular mechanisms of Neurodegeneration neurodegeneration. Dept. of Neurobiology and Behavior.

Shrestha, Prerana, Ph.D., The Rockefeller University, Cellular/molecular mechanisms of learning. Dept. of Neurobiology and Behavior.

Smith, Steven¹, Ph.D.: Structural Biology. Dept. of Biochemistry and Cell Biology

Solomon, Irene C.⁶, Ph.D., 1994, University of California, Davis: Neural control of respiratory motor output and fast oscillatory rhythms.

Tsirka, Styliani-Anna (Stella) ⁵, Ph.D., 1989, University of Thessaloniki: Neuronal-microglial interactions in the physiology and pathology of the central nervous system. Dept. of Pharmacology

Van Snellenberg, Jared, Ph.D. Columbia University, Neuropsychiatric disorders and addiction. Dept. of Psychiatry.


Xiong, Qiaojie, Ph.D., Johns Hopkins University: Neural mechanisms of learning and memory. Dept. of Neurobiology and Behavior.

Cold Spring Harbor Laboratories Faculty affiliated with the Program in Neuroscience

Albeanu, Dinu Florin, Ph.D. Harvard University.
Borniger, Jeremy, Ph.D., Ohio State University.
Cheadle, Lucas, Ph.D., Yale University.
Engel, Tatiana, Ph.D., Humboldt University of Berlin.
Hou, Helen, Ph.D., Harvard University.
Koulakov, Alexei, Ph.D., University of Minnesota.
Li, Bo, Ph.D., The University of British Columbia.
Shea, Stephen, Ph.D., The University of Chicago.
Tollkuhn, Jessica, Ph.D., University of California San Diego.
Van Aelst, Linda, Ph.D. Catholic University of Leuven.
Zador, Anthony, MD Ph.D., Yale University.

NOTE: The course descriptions for this program can be found in the corresponding program PDF or at COURSE SEARCH.