NEURAL SCIENCE (PHD)

NYU Neuroscience (https://neuroscience.nyu.edu/)

NYSED: 89290 **HEGIS:** 0425.00 **CIP:** 26.1501

Program Description

Understanding the brain is one of the great scientific challenges. How does the nervous system allow us to sense, move, learn, decide, remember, and think? How are the underlying neural circuits built by genetic and molecular programs? How do neurons communicate via synapses to transmit and store information? What goes wrong in neurodevelopmental disorders like autism and schizophrenia, and in neurodegenerative diseases like Alzheimer's and Parkinson's disease? And how can we model neurons, circuits and systems to better understand the brain? Graduate students in our PhD program in neuroscience are addressing these questions at labs located across NYU, using cutting-edge tools drawn from genetics, molecular biology, biochemistry, electrophysiology, microscopy, computer science, data science, and mathematics. This website is designed for you to learn about graduate training in neuroscience at NYU.

Our program arises from two cooperative centers located just a few city blocks apart: the Center for Neural Science (CNS) and the Neuroscience Institute (NI). CNS, located at NYU's Washington Square campus, is home to core neuroscience labs, has affiliate labs in biology, psychology, physics and data science, and is NYU's portal for undergraduate neuroscience education. The NI is located at NYU's school of medicine and houses additional core neuroscience labs, as well as affiliates from clinical departments and the Nathan Kline Institute. Together, CNS and NI serve as the joint pillars of graduate training in neuroscience at NYU, with research spanning genetic, molecular, cellular, developmental, systems, behavioral, and computational levels. Prospective graduate students apply through a single online portal and applications are jointly reviewed by a single admissions committee that spans CNS and NI.

Students in our PhD program receive comprehensive interdisciplinary training in all areas of neuroscience, with a strong emphasis placed on performing research at the highest level.

- At the start of their training, students choose an area of specialization — either Molecular, Cellular, and Translational (**MCT**) or Systems, Cognitive, and Computational (**SCC**) — allowing them to focus their study of brain function.
- During their first year, students take required coursework in cellular and systems neuroscience, neuroanatomy, and quantitative methods. They also perform lab rotations, typically 3 months each, in which they are exposed to the specific research problems and methods of 2 or 3 labs. Students are advised by a Director of Graduate Studies on rotation advisor selection, rotation and course progress, and managing a balance between courses and lab.
- By the start of their second year, students typically choose a thesis lab, and begin working with their faculty mentor to design a thesis project. While starting their thesis research, students continue course work with electives focused on their areas of expertise. Students also form an advisory committee, which is usually composed of 3 additional faculty from across our program.
- At the start of their third year, students have a qualifying exam, where they defend a written proposal in the format of a predoctoral NIH NRSA fellowship.
- In later years, students take elective courses and pursue original thesis research guided by their faculty mentor. Students typically meet with their advisory committee once or twice a year to receive outside feedback and guidance. Student give public talks on their research after the 1st and 3rd years, and participate in a variety of departmental, regional, and international scientific meetings. Many students also write successful fellowship applications to fund their own research, and their thesis research is often published in the most prominent scientific journals.
- In addition to academic courses and research, there is a strong emphasis on providing training and advice on teaching, career and scientific development, grant writing, community outreach, and broad communication skills.
- Graduate training finishes with a written dissertation, public talk, and oral defense, supervised by the thesis committee and an outside reviewer (typically a faculty member from another university).

Students in our program go on to do postdoctoral work in neuroscience, work in science, medicine, and other technical fields, and become research faculty at other institutions.

Admissions

All applicants to the Graduate School of Arts and Science (GSAS) are required to submit the general application requirements (https://gsas.nyu.edu/nyu-as/gsas/admissions/arc.html), which include:

- Academic Transcripts (https://gsas.nyu.edu/nyu-as/gsas/admissions/arc/academic-transcripts.html)
- Test Scores (https://gsas.nyu.edu/nyu-as/gsas/admissions/arc/test-scores.html) (if required)
- Applicant Statements (https://gsas.nyu.edu/nyu-as/gsas/admissions/arc/statements.html)
- Résumé or Curriculum Vitae
- Letters of Recommendation (https://gsas.nyu.edu/nyu-as/gsas/admissions/arc/letters-of-recommendation.html), and
- A non-refundable application fee (https://gsas.nyu.edu/admissions/arc.html#fee).

See Neural Science (https://gsas.nyu.edu/admissions/arc/programs/neural-science.html) for admission requirements and instructions specific to this program.

Program Requirements

Course	Title	Credits
Major Requirements		
Core Curriculum		*Credits*
Required during the first year:		
NEURL-GA 2201	Cellular Neuroscience	4
NEURL-GA 2202	Sensory & Motor Neural Science	4
NEURL-GA 2203	Lab Neural Science I	3
NEURL-GA 2204	Lab in Neural Science II	3
NEURL-GA 2210	Intro to Research I	3
NEURL-GA 2211	Intro to Research	3
Area of Specialization		
Additional first year courses will be determined by the area of specialization selected by the student. Select one of the following specializations: [1]		8
Systems and Computational Neuroscience		

NEURL-GA 2205	Behavioral & Cognitive Neural Science	
NEURL-GA 2207	Mathematical Tools for Neuroscience	
Molecular and Cellular Neuroscience		
BMSC-GA 2001	Topics in Molecular Biology	
BIOL-GA 2030	Statistics in Biology [2]	
Electives		
Two advanced elective courses in neural science or a related discipline [3]		6
Non-graded Courses and Electives		*38*
NEURL-GA 3390	Sem in Current Topics	
NEURL-GA 3380	Fellows Seminar	
NEURL-GA 3305	Reading Course in Neural Science [4]	
NEURL-GA 3306	Reading Course in Neural Science [4]	
NEURL-GA 3321	Research Problems in Neural Science [4]	
NEURL-GA 3301	Dissertation Research [5]	
Total Credits		**72**

1 These are all graded courses.
2 Students may replace this course with suitable alternative statistics courses with permission.
3 Selected in the second and third year, with approval from their advisory committee, to complete the remaining required number of graded credits (typically each is 3 credits).
4 The courses are intended to provide appropriate course credits for faculty-guided readings and research necessary for preparation of the PhD thesis. These courses can be taken more than once for credit.
5 Taken only by students who are preparing the thesis document and who have completed about 66 credits and the required number of credits in graded courses.

Additional Program Requirements

Thesis Lab Selection

In the first year and the subsequent summer, students will perform two or more laboratory rotations as part of the process for identifying an appropriate advisor and research area for the dissertation work. Rotations during the academic year are taken for credit and receive grades. During the second year, each student will usually have selected an area of primary research interest and the faculty member with matching research interests to serve as the primary advisor. Together they will develop a program of research that will eventually become the doctoral thesis work.

Qualifying

In order to qualify, students must first satisfactorily complete the first-year core curriculum and courses in one area of specialization. In addition, by the beginning of their third year they will prepare and submit a written qualifying exam to their thesis advisory committee. This was formerly called the “Second Year Paper”. The qualifying exam will be written in the form of an NIH NRSA pre-doctoral fellowship. The form of the paper should be suitable for submission as a fellowship or small research grant proposal; students are encouraged to seek independent funding for their research training. It should contain a literature review, an account of research progress, and a plan for future experiments based on any preliminary data that may have been obtained up to this point in training. Although the proposal does not bind students to pursue the experiments described as their thesis work, the proposed experiments should lay out a reasonable course of action based on progress to date. Copies should be submitted to each member of the committee and one to the Director of Graduate Studies.

Oral Presentation

After submitting the written qualifying exam to their thesis committee, students must then give an oral presentation of the proposed program of research to the committee. The committee must determine that the document and oral defense are acceptable for students to qualify for doctoral research.

Committee Meetings

Annual committee meetings will, in part, be used to monitor how the thoughts and plans first outlined in the proposal are shaped, developed, and altered through further discoveries. The formal process of writing a Dissertation Proposal in the third or fourth year is made less critical by regular committee meetings.

Research Talks

In September, students entering the 2nd year give brief talks based on research completed during one of the first year rotations. Fourth year students give full research talks, based on current research.

Dissertation and Final Examination

Students prepare their written dissertation based on their doctoral research and submit it to their examining committee. The final examination is the oral defense of the thesis, which includes a one-hour talk based on the written document. The examining committee usually consists of the three members of the dissertation committee plus two additional members, chosen by the student in consultation with the dissertation committee members and the Director of Graduate studies. One of the additional members is often an invited expert from outside of the University. Passage of the thesis defense is contingent on at least all but one of the examiners voting to accept the thesis and its defense.

Departmental Approval

All Graduate School of Arts & Science doctoral candidates must be approved for graduation by their department for the degree to be awarded.

Sample Plan of Study

Course	Title	Credits
1st Semester/Term		
NEURL-GA 2201	Cellular Neuroscience	4
NEURL-GA 2203	Lab Neural Science I	3
NEURL-GA 2207	Mathematical Tools for Neuroscience	4
NEURL-GA 2210	Intro to Research I	3
	Credits	**14**
2nd Semester/Term		
NEURL-GA 2202	Sensory & Motor Neural Science	4
NEURL-GA 2204	Lab in Neural Science II	3
NEURL-GA 2205	Behavioral & Cognitive Neural Science	4

NEURL-GA 2211	Intro to Research	3
	Credits	**14**
3rd Semester/Term		
NEURL-GA 3380	Fellows Seminar	1-2
NEURL-GA 3390	Sem in Current Topics	1-3
NEURL-GA 3305	Reading Course in Neural Science	1-3
General Elective I		3
	Credits	**10**
4th Semester/Term		
NEURL-GA 3392	Sem in Current Topics	1-3
NEURL-GA 3321	Research Problems in Neural Science	1-3
NEURL-GA 3306	Reading Course in Neural Science	1-3
General Elective II		3
	Credits	**9**
5th Semester/Term		
NEURL-GA 3321	Research Problems in Neural Science	1-3
NEURL-GA 3305	Reading Course in Neural Science	1-3
General Elective III		3
	Credits	**7**
6th Semester/Term		
NEURL-GA 3321	Research Problems in Neural Science	1-3
NEURL-GA 3306	Reading Course in Neural Science	1-3
	Credits	**6**
7th Semester/Term		
NEURL-GA 3321	Research Problems in Neural Science	1-3
NEURL-GA 3305	Reading Course in Neural Science	1-3
	Credits	**6**
8th Semester/Term		
NEURL-GA 3321	Research Problems in Neural Science	1-3
NEURL-GA 3306	Reading Course in Neural Science	1-3
	Credits	**6**
	Total Credits	**72**

Following completion of the required coursework for the PhD, students are expected to maintain active status at New York University by enrolling in a research/writing course or a Maintain Matriculation (MAINT-GA 4747) course. All non-course requirements must be fulfilled prior to degree conferral, although the specific timing of completion may vary from student-to-student.

Learning Outcomes

One of the main goals of the graduate program is for each student to produce original research in their chosen specialty. This includes the development and formulation of testable hypotheses, followed by the design and execution of experiments to test the hypotheses. The PhD dissertation is the outcome of this major endeavor.

Additionally, graduates will have:

1. A firm grasp of the background literature that are relevant to the student's field of study. Students are expected to become experts in their specialties but also be knowledgeable about basic principles in the many areas of neuroscience.
2. The ability to give oral presentations about their data to their peers. Students should be able to explain their results to a broad audience consisting of undergraduate students to experts in their fields.
3. Awareness of ethical issues regarding research. This includes the use of human subjects and animals, research misconduct, and publication practice.
4. Proficiency in writing articles for submission to scientific journals.
5. The ability to write and submit grant proposals to federal and private funding agencies.

Policies

NYU Policies

University-wide policies can be found on the New York University Policy pages (https://bulletins.nyu.edu/nyu/policies/).

Graduate School of Arts and Science Policies

Academic Policies for the Graduate School of Arts and Science can be found on the Academic Policies page (https://bulletins.nyu.edu/graduate/arts-science/academic-policies/).