At NYU, neuroscience graduate education provides integrated training that encompasses molecular, cellular, developmental, systems, cognitive, behavioral, and computational approaches to address the most important questions in the field. Doctoral training in neuroscience at NYU builds on the diversity and strength of research throughout many interrelated departments and multiple campuses, especially among those within the Center for Neural Science, the Neuroscience Institute, and NYU Shanghai.

Students receive a comprehensive, interdisciplinary neuroscience education, and they have the opportunity to sample different research experiences before they commit to a topic area and laboratory. Training strongly emphasizes research at the highest level throughout graduate school. Students also benefit directly from an interactive, collegial community and become active participants in shaping the rich, intellectual environment that complements their formal training.

This brochure will introduce you to NYU’s wide array of cutting-edge neuroscience research, our faculty and graduate students, and their most recent and exciting discoveries.
Key Components and Timeline of Study

Year

1

2-3 Lab Rotations
Core Neuroscience Courses
Track-Specialized Courses
Select Thesis Advisor & Committee
"First Year" Talk
Thesis Research
Qualifying Exams

2

Annual Committee Meeting
Thesis Research continues

3

Advanced Elective Courses
Annual Committee Meeting
"Third Year" Talk
Thesis Research continues

4

Annual Committee Meeting

5

Dissertation & Oral Defense
PhD in Neuroscience
Cell and Molecular Biology of Neurons and Glia

At NYU, researchers use cutting edge techniques, including two-photon microscopy, in vivo labeling of individual neurons, and microarray analysis, to investigate the electrical, biochemical, and genetic properties that underlie the function of the healthy and diseased brain at the cellular and molecular levels.

Development of motor axon projections in control (top) and PbxMNA (bottom) mice (Dasen lab)

Faculty

Cristina Alberini
Chiye Aoki
Justin Blau
Richard Bonneau
Steven Burden
Thomas Carew
Kenneth Carr
Adam Carter
Moses Chao
Mitchell Chesler
Jeremy Dasen
Claude Desplan
Andre Fenton
Wen-Biao Gan
Jorge Ghiso
Stephen Ginsberg
Eric Klann
Joseph LeDoux
Efrat Levy
Shane Liddelow
Arjun Masurkar
Paul Mathews
Ralph Nixon
Simon Peron
Dimitris Placantonakis
Margaret Rice
Niels Ringstad
James Salzer
Dan Sanes
Neville Sanjana
Helen Scharfman
Einar Sigurðsson
Nicholas Stavropoulos
Greg Suh
Daniel Tranchina
Nicolas Tritsch
Richard Tsien
Thomas Wisniewski
Select Recent Publications


Physiology of Cells and Synapses

Behavior arises as a result of cellular and synaptic activity. NYU neuroscientists are at the forefront of this research aiming to elucidate the underlying neural circuitry, using a wide array of technologies.

PV and SOM interneurons in the infralimbic PFC. (A) Labeling of PV interneurons in the PFC of a PV-Cre mouse. (B) Similar to (A) for SOM interneurons in the PFC of a SOM-Cre mouse. (C) Two-photon images of PV and SOM interneurons. (D) Response to 200 pA and -50 pA current injections (Carter lab)

Faculty

Chiye Aoki  
Jayeeta Basu  
Adam Carter  
Moses Chao  
Mitchell Chesler  
Dmitri Chklovskii  
Wen-Biao Gan  
Eric Lang  
Rodolfo Llinas  
Michael Long  
Katherine Nagel  
Simon Peron  
Alex Reyes  
Margaret Rice  
Dmitry Rinberg  
Niels Ringstad  
John Rinzel  
Bernardo Rudy  
Dan Sanes  
Helen Scharfman  
David Schoppik  
Nicolas Tritsch  
Richard Tsien  
Thomas Carew

Drebrin A immunoreactivity within dendritic spines and their presynaptic axon terminals (Aoki lab)
Physiology of Cells and Synapses

Digital reconstruction of an in vivo recorded and labeled L5/6 fanning-out Martinotti interneuron. Histogram shows average axonal length color coded by layer of reconstructed cells (Rudy lab)

Select Recent Publications


Neuroscientists across NYU are working to understand the processes of sensing, interpreting, and acting on stimuli in the environment. Using cutting-edge techniques and novel tools, our scientists ask how we decode odors, learn to balance, perceive texture and faces, and learn vocalizations.

Faculty

Dora Angelaki  Larry Maloney
Jayeeta Basu  Arjun Masurkar
Gyorgy Buzsaki  Anthony Movshon
David Cai  Katherine Nagel
Thomas Carew  Denis Pelli
Marisa Carrasco  Simon Peron
F. Xavier Castellanos  David Poeppel
Jeremy Dasen  Alex Reyes
Claude Desplan  Dmitry Rinberg
Zoe (Xiaowei) Dong  Bernardo Rudy
Jon Freeman  Dan Sanes
Robert Froemke  David Schoppik
Esther Gardner  David Schneider
Davi Geiger  Robert Shapley
Marc Gershow  Shy Shoham
Michael Hawken  Eero Simoncelli
Biyu He  Greg Suh
David Heeger  Regina Sullivan
Roozbeh Kiani  Xing Tian
Lynne Kiorpes  Daniel Tranchina
Michael Landy  Donald Wilson
Li Li  Jonathan Winawer
Michael Long  Yongdi Zhou
Wei Ji Ma

Measuring interneuron activity during active whisking (Rudy lab)
Visualizations of neural population responses in V1 and V2 to visual texture stimuli (Movshon and Simoncelli labs).

Select Recent Publications


Executive Function and Cognition

The brain gives rise to our thoughts, decisions, and sense of self. At levels of analysis ranging from molecules to humans, researchers at NYU reveal the neural substrates that underlie higher order mental processes such as consciousness, judgement and decision making, attention, working memory, inhibitory control, and cognitive flexibility.

Using tDCS to create a computational model of the neural underpinnings of conscious movement intention (He lab)

Faculty

<table>
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<tr>
<th>Dora Angelaki</th>
<th>Andre Fenton</th>
<th>Larry Maloney</th>
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Executive Function and Cognition

Select Recent Publications


Learning, Memory, and Development

Neuroplasticity can account for much of learning, memory and development. Neuroscientists at NYU are studying how we learn and remember information over time using a myriad of approaches, including electrophysiology, imaging, and genetic sequencing and manipulations.

Intracellular recording from serotonergic (5HT) neurons that respond to sensitizing stimuli (that induce memory formation (Carew lab)

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Learning, Memory, and Development

Depth profile of theta-nested gamma oscillations (Buzsaki lab)

Select Recent Publications


**Emotions and Behavioral States**

Emotions are complex physiological and psychological states that drive many of our actions and behaviors. Researchers at NYU investigate how emotions arise and impact behavior using many different approaches, including genetic engineering, tracing, and functional magnetic resonance imaging techniques.

![fMRI BOLD responses during late Avoidance/Extinction (Hartley lab).](image)

**Faculty**

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Esr1+ neurons in the VMHvl region of the hypothalamus are preferentially activated during (A) fighting and (B) mating in female mice. (Lin lab).

Select Recent Publications


Disorders

In addition to normal behavior, it is important to understand disorders of the nervous systems, such as neurodegenerative and neurodevelopmental disorders. Researchers at NYU are investigating these questions at various systems levels and with different models.

Spine density is decreased in select regions of the dendritic tree in Lrp4 mutant mice, a model of neuromuscular disorders (Burden lab)

Faculty

Dora Angelaki  David Heeger  Niels Ringstad
Chiye Aoki   Lynne Kiorpes  James Salzer
Steven Burden  Eric Klann  Neville Sanjana
Gyorgy Buzsaki  Joseph LeDoux  Helen Scharfman
Kenneth Carr  Efrat Levy  Einar Sigurdsson
F. Xavier Castellanos  Li Li  Nicholas Stavropoulos
Moses Chao  Shane Liddelow  Regina Sullivan
Wen-Biao Gan  Arjun Masurkar  Nicolas Tritsch
Jorge Ghiso  Paul Mathews  Richard Tsien
Stephen Ginsberg  Ralph Nixon  Daniel Turnbull
Paul Glimcher  Dimitris Placantonakis  Donald Wilson
Donald Goff  Margaret Rice  Thomas Wisniewski
Disorders

Select Recent Publications


Phosphorylated ribosomal S6 protein (red) in the hippocampus of fragile X syndrome model mice (Klann lab)
Computation

Computational modeling can help us to understand and make predictions about molecules, cells, circuits, systems, cognition, and behavior. Often working in parallel with experimentalists, computational neuroscientists continually refine their models and make testable predictions about how the brain works.

Zebrafish swim bout initiation becomes posture dependent as postural sensitivity improves with age. Observed values (top row) and simulated data (top row) (Schoppik lab)

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<td>Yann LeCun</td>
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Distinguishing four theoretical model network mechanisms for population coding and dynamics.
A) Example activity for one neural unit. (B) Correlation of population state (sensory is orange, memory purple) over time. (C) Delay-activity state-specific trajectories (Wang lab)

Select Recent publications

Heeger, Carrasco, and Rinzel labs (2017). Attention model of binocular rivalry. PNAS.


The NYU Neuroscience Community

The NYU Neuroscience community comes together for a wealth of scientific events that encourage interdisciplinary, cross-campus interactions to ensure a stimulating environment for graduate training.

Weekly Joint Neuroscience Colloquia are a fundamental component of the community, featuring esteemed neuroscientists from around the world. Students have the opportunity to informally meet with invited speakers.

The Swartz Seminar Series promotes the theoretical neuroscience community at NYU by inviting distinguished computational and theoretical neuroscientists to speak about their research.

Annual Neuroscience Retreats are held in a picturesque, upstate New York resort and bring together faculty and students for a 3-day scientific meeting focused on fostering new collaborations.

Other events like Weekly Group Meeting and Fellows’ Seminars highlight our students’ research in progress, giving them an opportunity to present their research and receive valuable input.

In the Growing up in Science series faculty members share their stories about becoming and being scientists to foster an open dialogue about the often unspoken human factors in academia.
The NYU Neuroscience Community

NOGN: The Neuroscience Outreach Group at NYU brings the brain to the city by visiting classrooms, hosting public events, and partnering with local educational and cultural institutions.

NeuWrite integrates the Scientific and Science Communication communities through events, talks, and a monthly workshop in order to create excellent and compelling science journalism and art.

The NYU Biotech Association hosts events that focus on applications of biomedical science in industry, business, law, and translational research.

The NYU STEP program is an NIH-funded series that helps graduate student and postdoc trainees identify career goals and provides resources needed to pursue them.

ScAAN: Scientist Action and Advocacy Network is a NYU-based group of scientists that partners with organizations that are creating positive social change.
A Selection of Current NYU Neuroscience Students

Billy Broderick (BA, Oberlin College) is a 2nd year student in the Winawer and Simoncelli labs, using fMRI and computation to study low-level vision in the human brain.

Margot Elmaleh (BA, Brown University) is a 2nd year graduate student in the Long Lab investigating song production circuitry during sleep.

Gerrick Lee (MSc, ETH Zurich & University of Zurich) is a 3rd year student in the Movshon Lab using visual development and disorders to investigate neural information processing.

Janelle Miranda-Fajardo (BS, UPR - Rio Piedras) is a 3rd year student in the Alberini Lab, investigating the mechanisms of memory formation during early development.

Andrew Matheson (BSc, McGill University) is a 3rd year student in the Nagel Lab and is investigating the neural circuits underlying olfactory navigation in Drosophila.

Daniel Levenstein (MS, Cornell University) is a 4th year student in the Buszáki and Rinzel Labs creating dynamical models of how neural activity is coordinated during sleep.

Katie Eyring (BA, Wellesley College) is a 4th year graduate student working in the Tsien and Nagel Labs on the mechanisms and functions of short-term plasticity.

Qiuling Li (BA, Mount Holyoke College) is a 5th year student in the Stavropoulos Lab investigating the neuronal role of protein ubiquitination in regulating sleep.
NYU Neuroscience Students By the Numbers

2017 Incoming Class

63% female
25% international
19% from diverse backgrounds

Graduate Student Averages

2.0 first author papers
3.0 publications
5.3 years to degree

Alumni Placement

Training Program Stats

104 training faculty
120 students
22 current students with fellowships
Emre Aksay, PhD ’01, is an Associate Professor at Weill Cornell, and he investigates the molecular, cellular, and circuit mechanisms of temporal integration in neurons.

Nicole Rust, PhD ’04, is an Assistant Professor at the University of Pennsylvania studying how the brain stores visual memories and recognizes objects.

Alexander Jaworski, PhD ’06, is an Assistant Professor at Brown University studying how the complex wiring pattern of the brain is established during embryonic development.

Mehrdad Jazayeri, PhD ’07, is an Assistant Professor at MIT. He is interested in the neural bases of complex behaviors such as flexible timing and sensorimotor integration.

Jeremy Freeman, PhD ’12, is a computational biologist at the Chen Zuckerberg Initiative, after two years as a Group Leader at Janelia Research Campus.

Bianca Jones Marlin, PhD ’14, is a postdoctoral fellow with Richard Axel at Columbia University, where she investigates the role of cognitive flexibility in innate behaviors.

Thu Huynh, PhD ’15 is a postdoctoral fellow with Conor Liston at Weill Cornell Medicine investigating prefrontal microcircuit mechanisms underlying extinction memory formation using novel methods of calcium imaging.

Georg Kosche, PhD ’16, is a postdoctoral fellow with Botand Roska at the Friedrich Miescher Institute investigating the structure and function of neural circuits.
A Selection of NYU Neuroscience Alumni
Neuroscience faculty can be found in more than a dozen academic departments at NYU. Labs are located on both the School of Medicine campus and the Washington Square campus (see the map below) as well as at the nearby Nathan S. Kline Institute for Psychiatric Research. Free shuttles provide easy access to both campuses and other areas of the city. NYC public transportation is also very convenient, and Citibikes are easy to find on both campuses.

Labs working in all areas of neuroscience are well-equipped with state-of-the-art research facilities that support basic, translational, and clinical neuroscience.
Students receive full support throughout their tenure in graduate school so that they can devote themselves full time to their studies. Support comes from the University, a number of training grants, as well as research grants. The program also trains students in the art of grant writing, and many successfully secure fellowships from the NIH, NSF, and other sources.

To assist students, NYU provides housing benefits that offset the cost of living in New York City. Neuroscience students have access to subsidized apartments, either through the School of Medicine’s Housing Services or through the MacCracken program.
Apply to NYU Neuroscience

Applications for the Neural Science graduate program (based in the Graduate School of Arts and Science’s Center for Neural Science, and NYU Shanghai’s Institute of Brain and Cognitive Science) and the Neuroscience & Physiology graduate program (based in the School of Medicine’s Sackler Institute) jointly review applications and accept candidates. To learn more about NYU Neuroscience and to access our application, visit us online.

To apply, visit neuroscience.nyu.edu.

The application deadline for Fall 2018 is December 1, 2017.

Contact Us

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