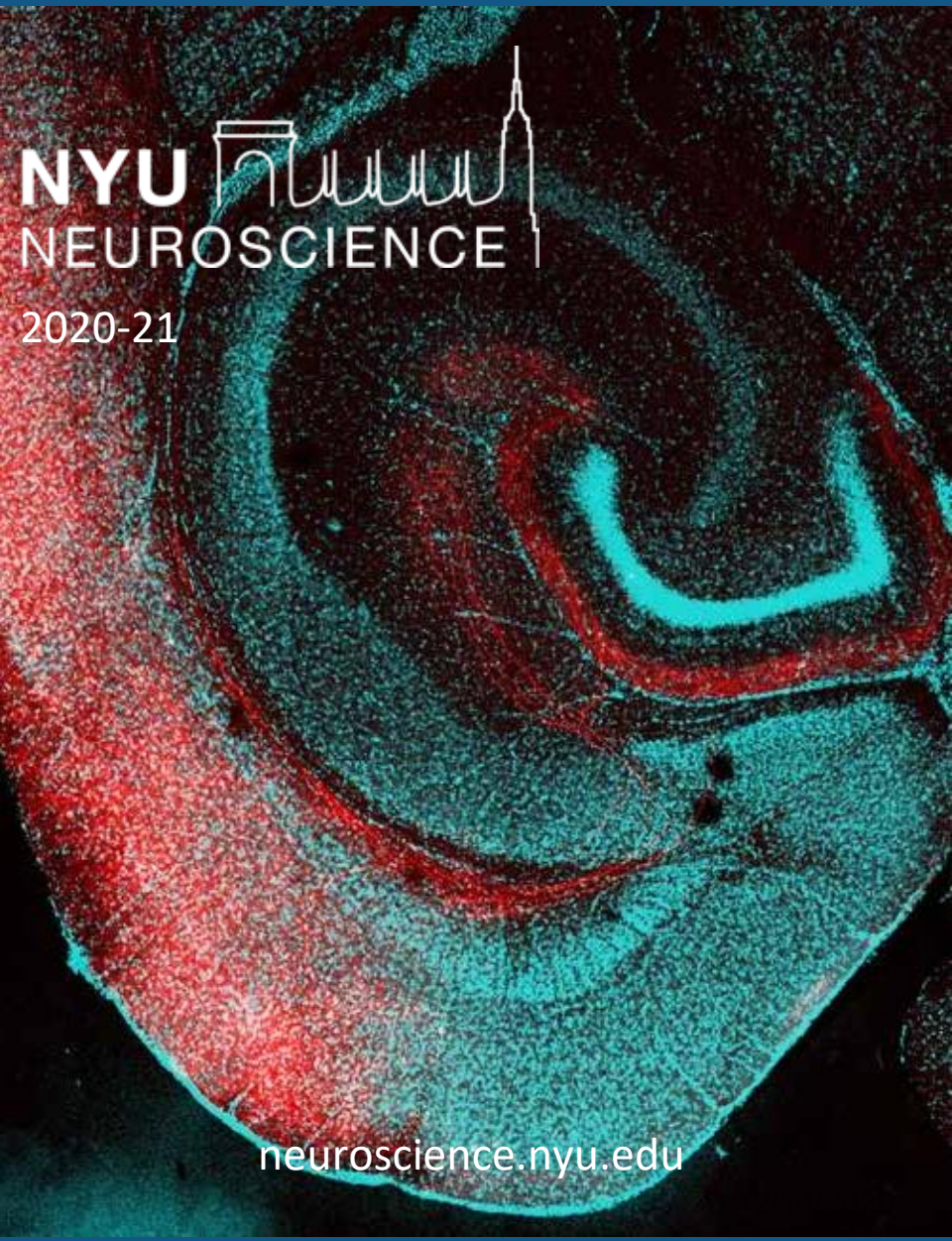
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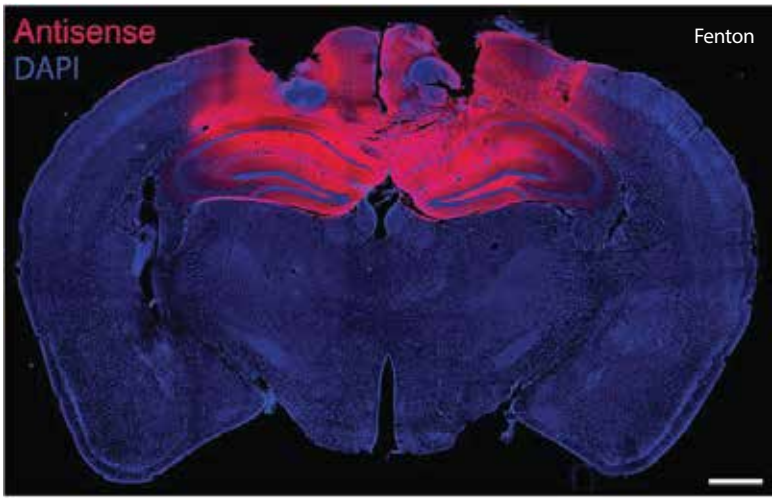
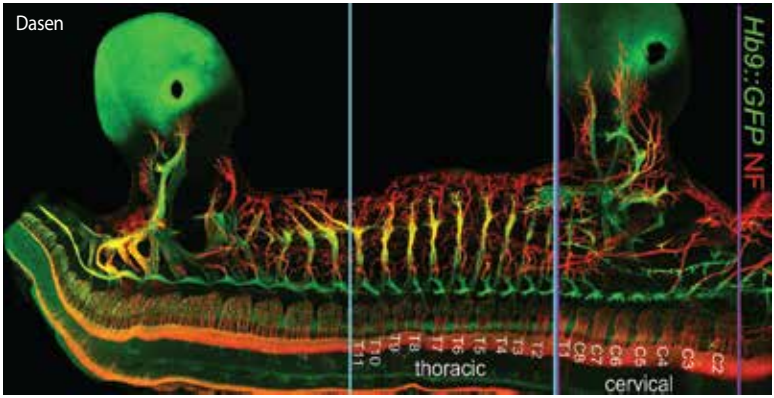




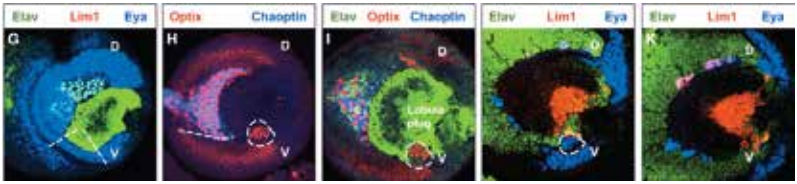
Cover image: Basu

NYU Neuroscience Doctoral Education

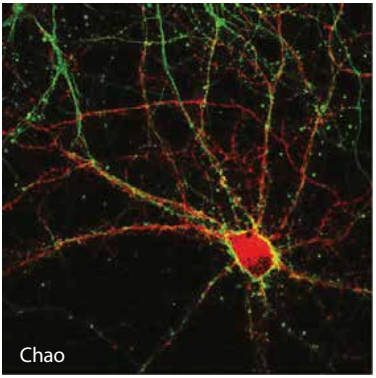
At NYU, neuroscience graduate education provides integrated training that encompasses molecular, cellular, developmental, systems, cognitive, behavioral, and computational approaches to address the most important questions in the field. Doctoral training in neuroscience at NYU builds on the diversity 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.

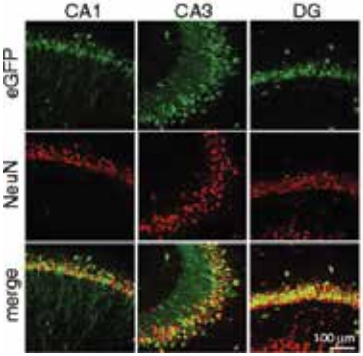
Students receive a comprehensive, interdisciplinary neuroscience education, and they have the opportunity to sample different research experiences before they commit to a topic area and laboratory. Training strongly emphasizes research at the highest level and faculty are dedicated to mentoring and career development 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.

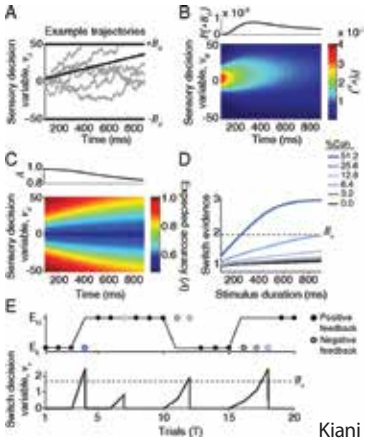


Desplan

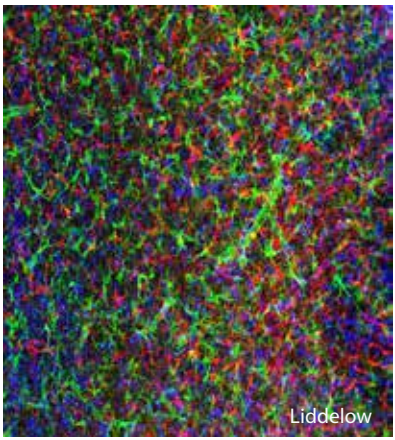




Alberini



Kiani



Key Components and Timeline of Study

Year	
1	2-3 Lab Rotations
	Core Neuroscience Courses
	Track-Specialized Courses
2	Select Thesis Advisor & Committee
	"First Year" Talk
	Thesis Research
	Qualifying Exams
3	Advanced Elective Courses
	Thesis Research continues
	Annual Committee Meeting
4	"Third Year" Talk
	Thesis Research continues
	Annual Committee Meeting
5	Dissertation & Oral Defense
	PhD in Neuroscience

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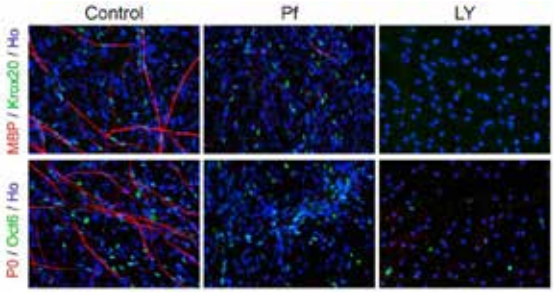
Cell and Molecular Biology of Neurons and Glia

Researchers at NYU use cutting edge techniques, including two-photon microscopy, in vivo labeling of individual molecules and neurons, and RNA sequencing 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.

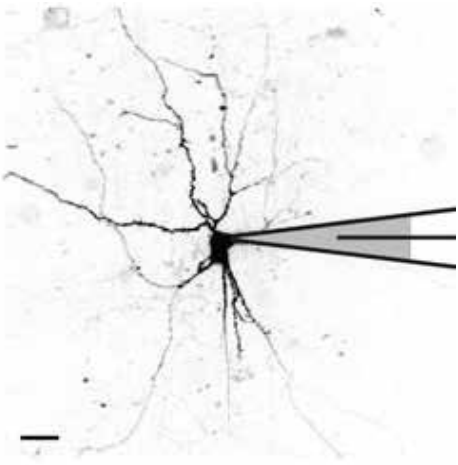


Akt inhibition blocks myelin formation in vitro without affecting Krox20 levels (Salzer lab)

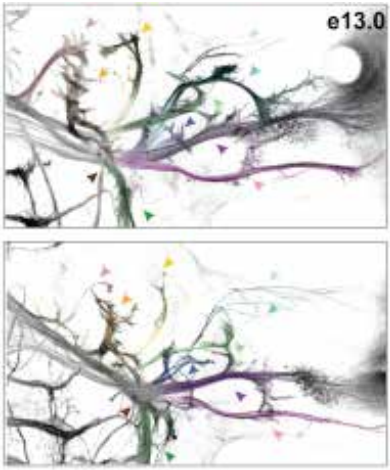
Faculty

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

Cell and Molecular Biology of Neurons and Glia



Two-photon image of somatostatin interneuron during whole-cell recording (Carter lab)



Motor axon projections in control (top) and PbxMNΔ (bottom) mice (Dasen lab)

Select Recent Publications

Trauner lab (2018). Optical control of L-type Ca2+ channels using a diltiazem photoswitch. Nature Chemical Biology.

Salzer lab (2018). Localized myosin II activity regulates assembly and plasticity of the axon initial segment. Neuron.

Desplan lab (2018). Phenotypic convergence: distinct transcription factors regulate common terminal features. Cell.

Burden lab (2018). Preserving neuromuscular synapses in ALS by stimulating MuSK with a therapeutic agonist antibody. eLife.

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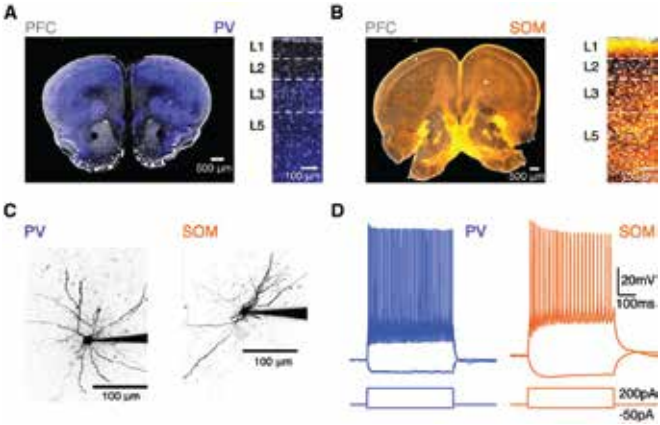
Physiology of Cells and Synapses

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.

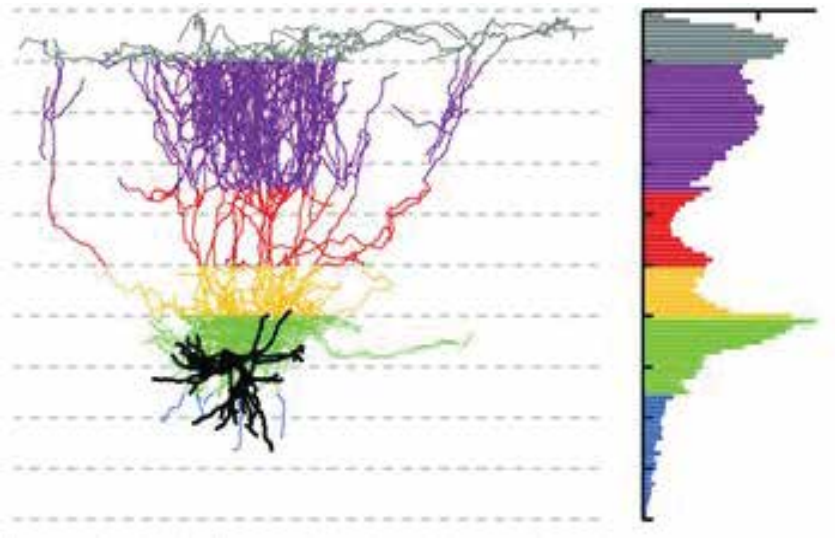


PV and SOM interneurons in the infralimbic PFC. (A) Labeling of PV interneurons in the PFC of a PV-Cre mouse. (B) Similar to (A) for SOM interneurons in the PFC of a SOM-Cre mouse. (C) Two-photon images of PV and SOM interneurons. (D) Response to 200 pA and -50 pA current injections (Carter lab)

Faculty

Chiye Aoki
Jayeeta Basu
Steven Burden
Gyorgy Buzsaki
Thomas Carew
Adam Carter
Moses Chao
Mitchell Chesler
Dmitri Chklovskii
Christine Constantinople
Robert Froemke
Eric Lang
Shane Liddelow
Michael Long
Katherine Nagel
Simon Peron
Alex Reyes
Margaret Rice
Dmitry Rinberg
Niels Ringstad
John Rinzel
Bernardo Rudy
Dan Sanes
James Salzer
Helen Scharfman
David Schoppik
Shy Shoham
Nicolas Tritsch
Richard Tsien

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

Sanes lab (2018). Developmental deprivation-induced perceptual and cortical processing deficits in awake-behaving animals. eLife.

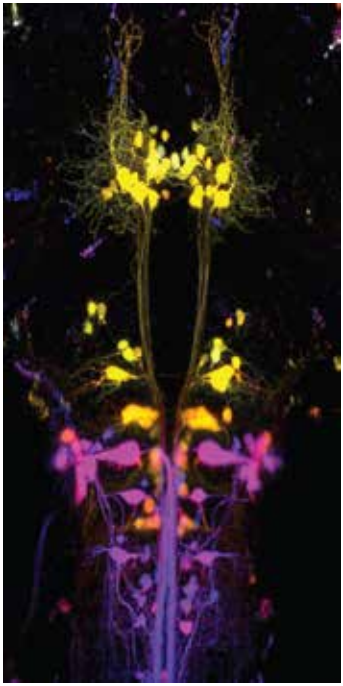
Buzsaki lab (2018). Transformation of a spatial map across the hippocampal-lateral septal circuit. Neuron.

Carter lab (2018). Reciprocal circuits linking the prefrontal cortex with dorsal and ventral thalamic nuclei. Neuron.

Tsien lab (2018). Calmodulin shuttling mediates cytonuclear signaling to trigger experience-dependent transcription and memory. Nature Communications.

Sensation, Perception, and Movement

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.

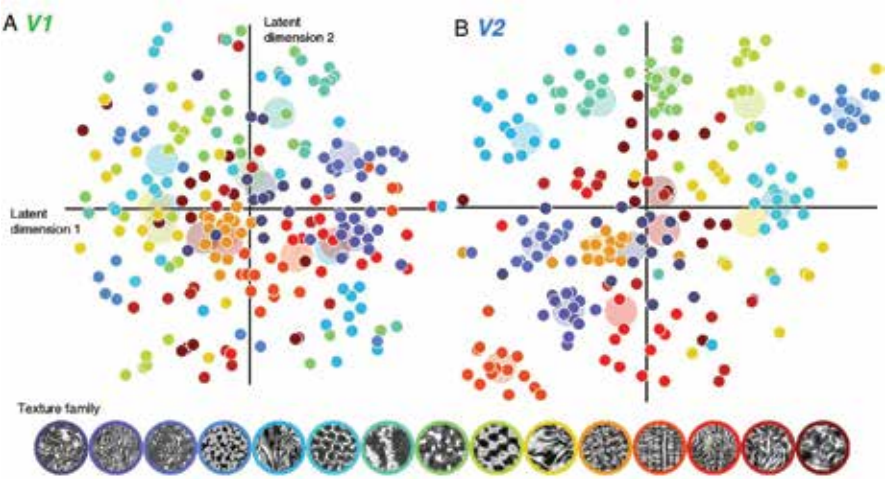


Neurons that project to the spinal cord, color-coded by depth (Schoppik lab)

Faculty

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

Sensation, Perception, and Movement



Visualizations of neural population responses in V1 and V2 to visual texture stimuli (Movshon and Simoncelli labs).

Select Recent Publications

Nagel lab (2018). Elementary sensory-motor transformations underlying olfactory navigation in walking fruit-flies. eLife.

Rinberg lab (2018). Single olfactory receptors set odor detection thresholds. Nature Communications.

Simoncelli and Movshon labs (2018). Contextual modulation of sensitivity to naturalistic image structure in macaque V2. Journal of Neuroscience.

Kiani lab (2018). Psychophysical reverse correlation reflects both sensory and decision-making processes. Nature Communications.

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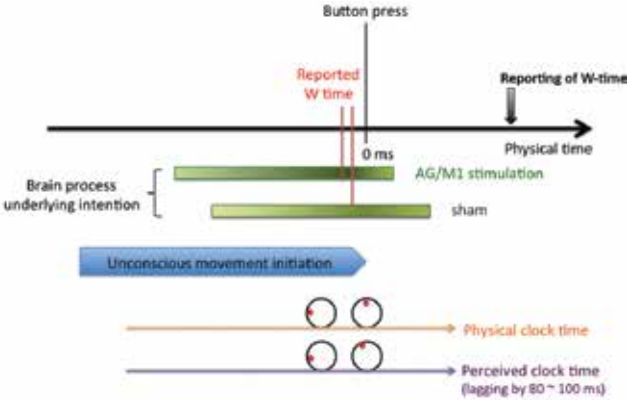
Executive Function and Cognition

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 a consciousness, judgement and decision making, attention, working memory, inhibitory control, and cognitive flexibility.

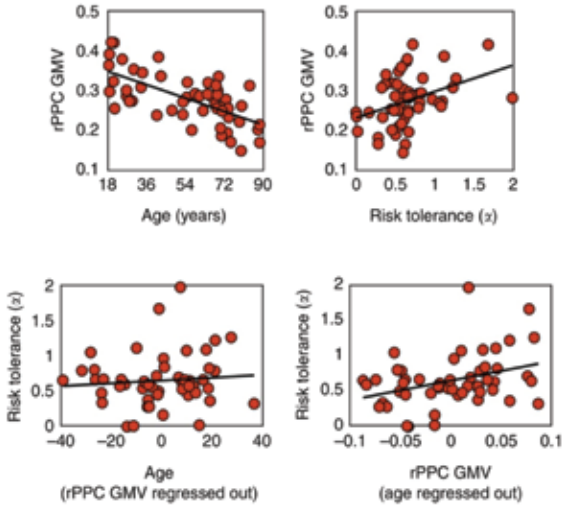


Using tDCS to create a computational model of the neural underpinnings of conscious movement intention (He lab)

Faculty

Cristina Alberini
Dora Angelaki
Jayeeta Basu
Gyorgy Buzsaki
Xinying Cai
Marisa Carrasco
F. Xavier Castellanos
Christine Constantinople
Clayton Curtis
Zoe (Xiaowei) Dong
Jeffrey Erlich
Andre Fenton
Jon Freeman
Paul Glimcher
Todd Gureckis
Catherine Hartley
Biyu He
Wei Ji Ma
Roozbeh Kiani
Michael Landy
Li Li
Sukbin Lim
Larry Maloney
Denis Pelli
Bijan Pesaran
David Poeppel
David Schneider
Xing Tian
Xiao-Jing Wang
Jonathan Winawer

Executive Function and Cognition



Decreased grey matter volume (GMV) in the right posterior parietal cortex (rPPC) is associated with increased age and decreased risk tolerance (top). When controlling for age, only decreased GMV in the rPPC modulates risk preference (bottom; Glimcher lab)

Select Recent Publications

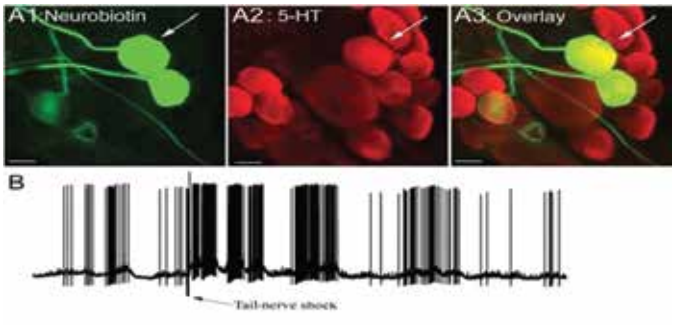
Ma lab (2018). A resource-rational theory of set size effects in human visual working memory. eLife.

Glimcher lab (2018). The computational form of craving is a selective multiplication of economic value. PNAS.

He lab (2018). Neural integration of stimulus history underlies prediction for naturalistically evolving sequences. Journal of Neuroscience.

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.

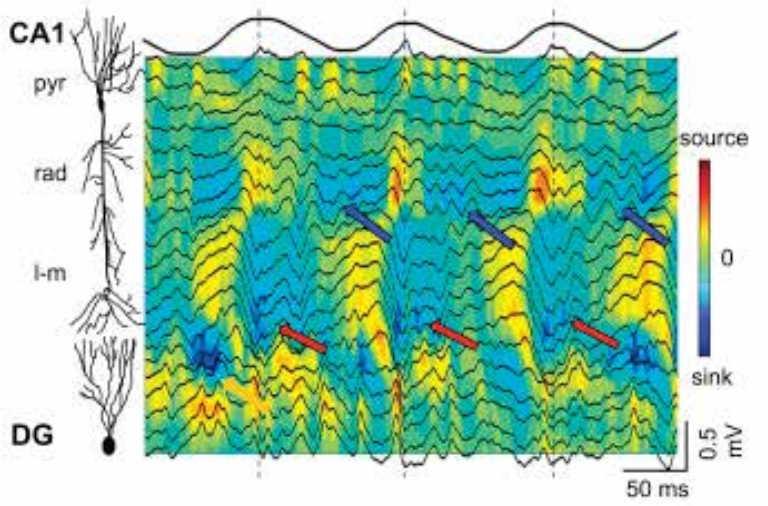


Intracellular recording from serotonergic (5HT) neurons that respond to sensitizing stimuli that induce memory formation (Carew lab)

Faculty

Karen Adolph
Cristina Alberini
Dora Angelaki
Chiye Aoki
Jayeeta Basu
Gyorgy Buzsaki
Thomas Carew
Kenneth Carr
Adam Carter
F. Xavier Castellanos
Moses Chao
Clayton Curtis
Jeremy Dasen
Claude Desplan
Zoe (Xiaowei) Dong
Jeffrey Erlich
Andre Fenton
Robert Froemke
Catherine Hartley
Paul Glimcher
Todd Gureckis
Lynne Kiorpes
Eric Klann
Joseph LeDoux
Sukbin Lim
Michael Long
Wei Ji Ma
Arjun Masurkar
Anthony Movshon
Dan Sanes
Cristina Savin
David Schoppik
Greg Suh
Regina Sullivan
Wendy Suzuki
Xing Tian
Richard Tsien
Xiao-Jing Wang
Donald Wilson
Jonathan Winawer
Yongdi Zhou

Learning, Memory, and Development



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

Select Recent Publications

Fenton lab (2018). On how the dentate gyrus contributes to memory discrimination. Nature Neuroscience.

Dasen and Schoppik labs (2018). The ancient origins of neural substrates for land walking. Cell.

Long lab (2018). Stable sequential activity underlying the maintenance of a precisely executed skilled behavior. Neuron.

Alberini lab (2017). Direct dorsal hippocampal-prelimbic cortex connections strengthen fear memories. Nature Neuroscience.

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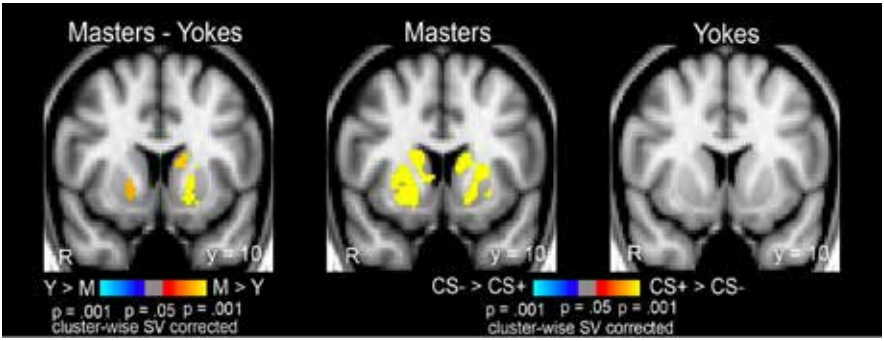
Emotions and Behavioral States

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).

Faculty

Cristina Alberini
David Amodio
Chiye Aoki
Jayeeta Basu
Justin Blau
Gyorgy Buzsaki
Kenneth Carr
Marisa Carrasco
Adam Carter
F. Xavier Castellanos
Zoe (Xiaowei) Dong
Jeffrey Erlich
Andre Fenton
Jon Freeman
Robert Froemke
Paul Glimcher
Catherine Hartley
Biyu He
Eric Klann
Joseph LeDoux
Dayu Lin
Katherine Nagel
Margaret Rice
Helen Scharfman
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Greg Suh
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Jing Wang
Donald Wilson

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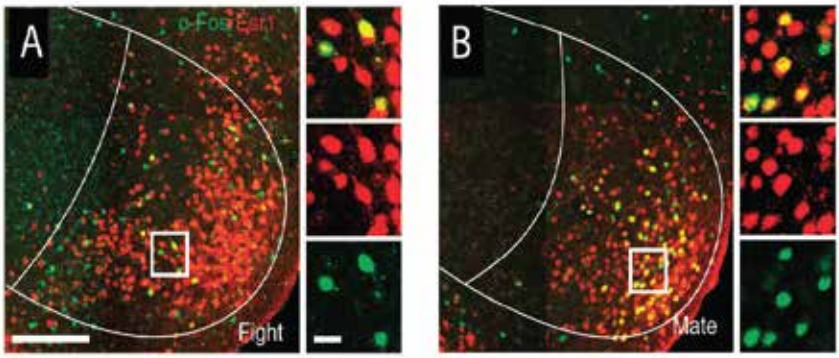
Emotions and Behavioral States



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

LeDoux lab (2018). β-Adrenergic enhancement of neuronal excitability in the lateral amygdala is developmentally gated. Journal of Neurophysiology.

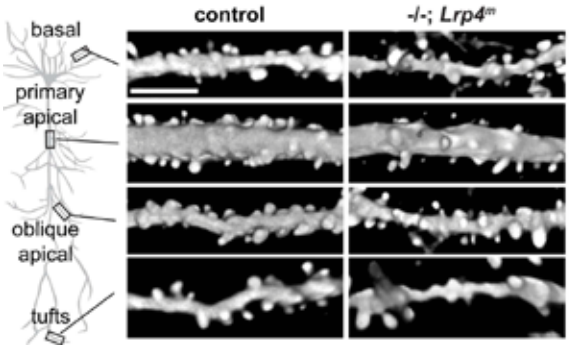
Sullivan lab (2017). Freezing suppression by oxytocin in central amygdala allows alternate defensive behaviours and mother-pup interactions. eLife.

Buzsaki lab (2018). Cocaine place conditioning strengthens location-specific hippocampal coupling to the nucleus accumbens. Neuron.

Carrasco lab (2018). Emotion and anxiety potentiate the way attention alters visual appearance. Science Reports.

Disorders

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

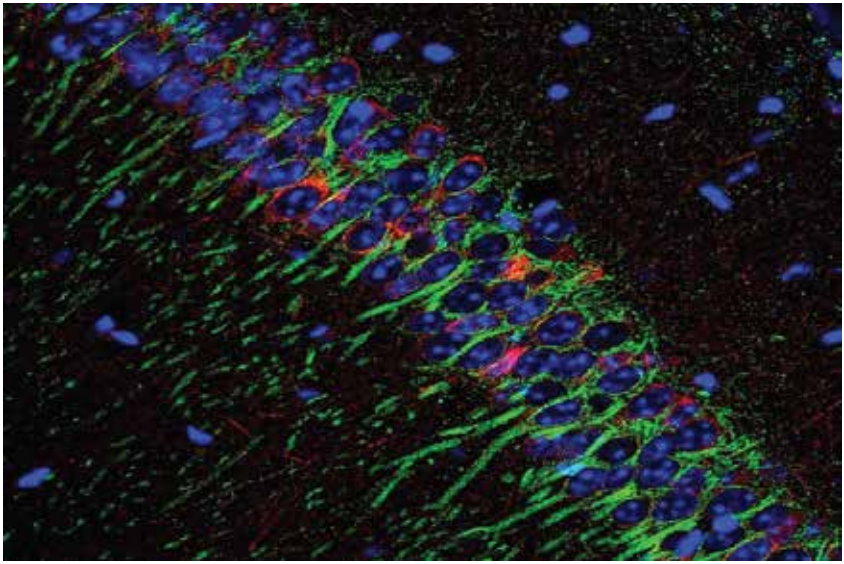


Spine density is decreased in select regions of the dendritic tree in Lrp4 mutant mice, a model of neuromuscular disorders (Burden lab)

Faculty

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

Disorders



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

Select Recent Publications

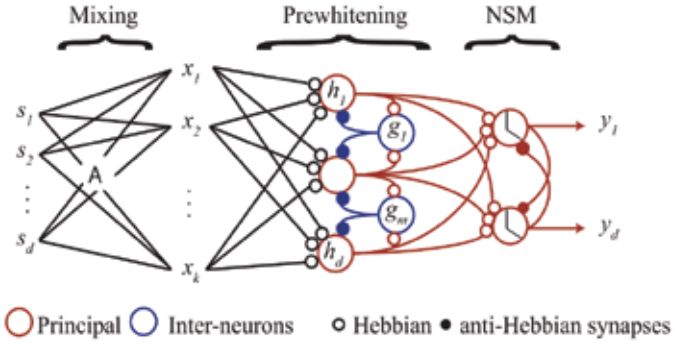
Fenton lab (2018). Normal CA1 place fields but discoordinated network discharge in a Fmr1-null mouse model of Fragile X Syndrome. Neuron.

Sigurdsson lab (2018). Tau antibody structure reveals a molecular switch defining a pathological conformation of the tau protein. Science Reports.

Ringstad lab (2018). Antagonistic regulation of trafficking to Caenorhabditis elegans sensory cilia by a retinal degeneration 3 homolog and retromer. PNAS.

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.

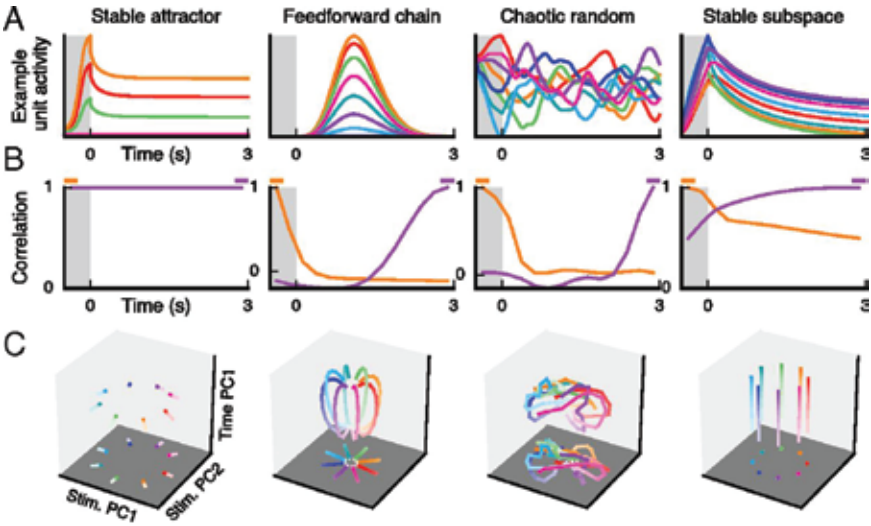


Biologically plausible network for blind source separation (Chklovskii lab)

Faculty

Dora Angelaki
Richard Bonneau
Gyorgy Buzsaki
Dmitri Chklovskii
Christine Constantinople
Andre Fenton
Davi Geiger
Paul Glimcher
Todd Gureckis
Biyu He
David Heeger
Yann LeCun
Sukbin Lim
Michael Long
Wei Ji Ma
Anthony Movshon
Katherine Nagel
Bijan Pesaran
Charles Peskin
Alex Reyes
Dmitry Rinberg
John Rinzel
Cristina Savin
David Schoppik
Robert Shapley
Michael Shelley
Eero Simoncelli
Daniel Tranchina
Xiao-Jing Wang
Lai-Sang Young

Computation



Distinguishing four teoretical 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 lab (2018). Stimulus vignetting and orientation selectivity in human visual cortex. eLife.

Rinzel lab (2017). Signatures of somatic inhibition and dendritic excitation in auditory brainstem field potentials. Journal of Neuroscience.

He lab (2018). Beyond trial-based paradigms: continuous behavior, ongoing neural activity, and natural stimuli. Journal of Neuroscience.

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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 bring together faculty and students for a multi-day scientific meeting focused on fostering new collaborations and showcasing the cutting edge work of the neuroscience community.

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

Rachel Kim (BA, Barnard College) is a 2nd year student in the Liddelow lab studying molecular mechanisms of A2 reactive astrocyte induction and function.

Nikhil Parthasarathy (BS/MS, Stanford University) is a 2nd year student in the Simoncelli lab using computation and theory to build better models of mid-level visual processing

Billy Broderick (BA, Oberlin College) is a 3rd year student in the Winawer and Simoncelli labs using fMRI and computation to study low-level vision in the human brain.

Margot Elmaleh (BS, Brown University) is a 3rd year graduate student in the Long Lab investigating song production circuitry during sleep.

Janelle Miranda-Fajardo (BS, UPR - Rio Piedras) is a 4th year student in the Alberini Lab investigating the mechanisms of memory formation during early development.

Andrew Matheson (BSc, McGill University) is a 4th year student in the Nagel Lab and is investigating the neural circuits underlying olfactory navigation in Drosophila.

Daniel Levenstein (MS, Cornell University) is a 5th year student in the Buszaki and Rinzel Labs creating dynamical models of how neural activity is coordinated during sleep.

Katie Eyring (BA, Wellesley College) is a 5th year graduate student working in the Tsien Lab on the mechanisms and functions of short-term plasticity.

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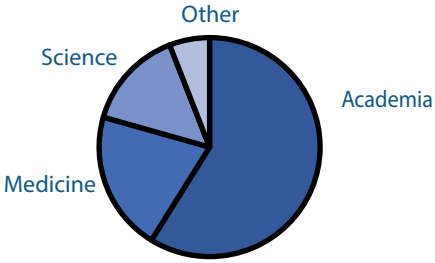
NYU Neuroscience Students By the Numbers

2018 Incoming Class

61% female

22% international

Alumni Placement



Graduate Student Publications

1.4
first author papers

3.0
publications

12%
students who publish rotation work

Training Program Stats

116 training faculty

121 students

38 current students with fellowships

5.5 years to degree

DC 12/14/2020

A Selection of NYU Neuroscience Alumni

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 Associate Professor at the University of Pennsylvania studying how the brain stores visual memories and recognizes objects.

Jonathan Pillow, PhD '05, is an Associate Professor in Psychology and the Princeton Neuroscience Institute at Princeton University. His research focuses on neural coding and statistical analysis methods for large neural datasets.

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.

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.

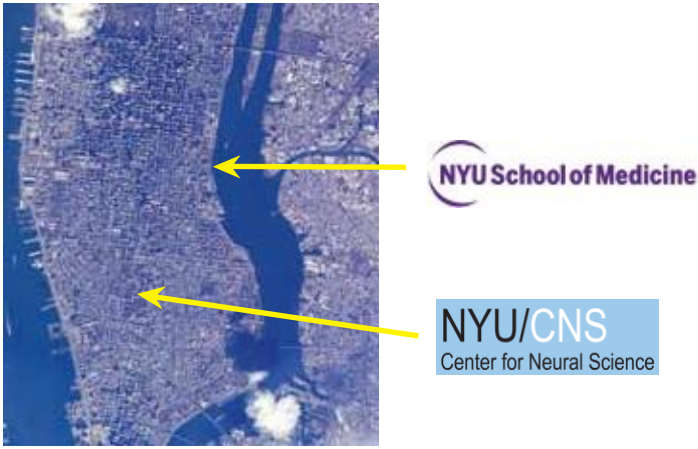
Georg Kosche, PhD '16, is a postdoctoral fellow with Botand Roska at the Friedrich Miescher Institute investigating the structure and fuction of neural circuits.

A Selection of NYU Neuroscience Alumni

NYU and Living in NYC

Neuroscience faculty can be found in more than a dozen academic departments at NYU. Labs are located on both the NYU Grossman 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.



NYU and Living in NYC

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.

Notes

Notes

Apply to NYU Neuroscience

Applications for the Doctoral Program in Neural Science (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 Graduate Program in Neuroscience & Physiology (based in the School of Medicine s Vilcek Institute) are jointly reviewed by a single admissions committee. 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 2021 is **December 1, 2021**.

Contact Us

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