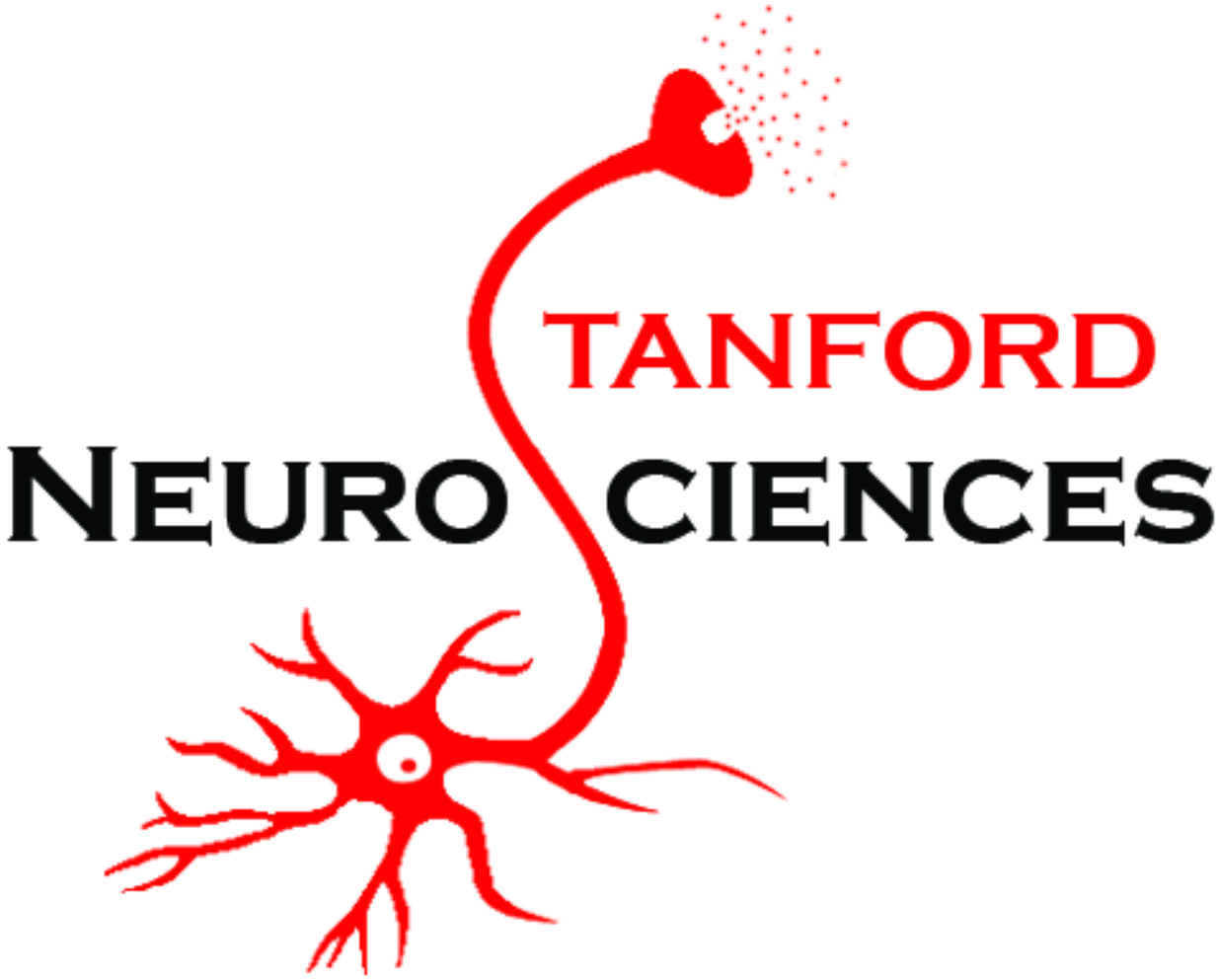

The Stanford Neurosciences Program Handbook 2010-2011

Contents

Welcome to Stanford!

We all expect that your graduate training will be stimulating, your research fruitful, and your overall experience with colleagues and friends at Stanford enjoyable. Although the formal requirements for a PhD degree are few, the administrative paperwork for properly processing your stipend and tuition payments, and for progressing through the various academic steps such as advancement to candidacy, completion of the oral exam, and submission of the completed dissertation can be tedious, if not confusing.

This handbook should help you obtain a PhD in the smallest number of steps. It details the requirements and guidelines set by the University and by the Neurosciences Program, which apply to the 2010-2011 entering class.

Those of you who have been in the program for more than a year will also find the handbook useful. It indicates which forms need to be submitted and when they are to be submitted. In addition, the handbook has useful information about life at Stanford. It is unlikely to answer all of your questions. The Program Director, the Program Administrator, and the Program Coordinator, as well as your fellow students (and especially your student representatives), will help you with such questions as they arise.

The Program's home page can be found at:

http://neuroscienceprogram.stanford.edu/

The Neurosciences Program History

The Neurosciences Program at Stanford is an interdisciplinary training program with a tradition of excellence in teaching and research. It was established in 1962 in order to coordinate the training of PhD candidates in the diverse areas of neuroscience. The Program consists of approximately 80 graduate students who are funded by a National Institute of Mental Health training grant, individual fellowships and research assistantships. There are approximately 114 faculty members with expertise in molecular neurobiology, developmental neuroscience, membrane excitability, cellular neuroscience, systems/behavioral neuroscience and computational neuroscience.

Program faculty are affiliated with 22 departments:

Anesthesia
Bioengineering
Biology
Chemical and Systems Biology
Comparative Medicine
Computer Science
Developmental Biology
Electrical Engineering
Genetics
Microbiology and Immunology
Molecular and Cellular Physiology
Neurobiology
Neurology and Neurological Sciences
Neurosurgery
Ophthalmology
Otolaryngology
Pathology
Pediatrics
Philosophy
Psychiatry and Behavioral Sciences
Psychology
Radiology

Each of these departments contributes to the Program by offering courses and sponsoring seminars in the Neurosciences as well as providing the space and intellectual atmosphere for students to carry out their research. The range and quality of faculty expertise offer unique interdisciplinary training and research opportunities. A single campus includes both the Medical Center and the Departments of Biological Sciences and Psychology and facilitates close interactions between students, faculty and postdoctoral fellows.

Program Offices and Staff

The Program's administrative office address is:

Neurosciences Program
Stanford University School of Medicine
Modular B, Room 42
1215 Welch Road
Stanford, CA 94305-5400

Neurosciences Program Administrative Staff

Director: John Huguenard
Office: Alway M-016
Mail Code: 5122
Phone: 650.725.6666
Fax: 650.723.1080
Email: john.huguenard@stanford.edu

Administrator: Ross Colvin
Office: Modular B, Room 42
Mail Code: 5400
Phone: 650.723.9855
Fax: 650.721.6434
Email: larkspur@stanford.edu

Coordinator: Katie Johnson
Office: Modular B, Room 46
Mail Code: 5400
Phone: 650.721.1939
Fax: 650.721.6434
Email: katiej2@stanford.edu

The Degree Progress Office, a division of the Office of the Registrar, oversees your program of study, to insure you are progressing in compliance with University requirements. Their address is:

Degree Progress Office
Office of the Registrar
630 Serra Street
Suite 120

Phone: 650.723.3056
Fax: 650.725.7248
Email: registrar@stanford.edu

Program Committee

The Neurosciences Program Committee is responsible for setting policies and guidelines in all aspects of the Program.

Name	Department	Term
Katrin Andreasson Associate Professor	Neurology and Neurological Sciences	2008-2011
Paul Buckmaster Associate Professor	Comparative Medicine	2010-2013
Tom Clandinin Associate Professor	Neurobiology	2008-2011
Luis de Lecea Associate Professor	Psychiatry and Behavioral Sciences	2008-2011
John Huguenard *Chair*, Professor	Neurology and Neurological Sciences Term:	1997-2011
Fei-Fei Li Assistant Professor	Computer Science	2010-2013
Merritt Maduke Associate Professor	Molecular and Cellular Physiology	2010-2013
Samuel McClure Assistant Professor	Psychology	2010-2013
Anthony Ricci Professor	Otolaryngology/Head and Neck Surgery	2010-2013
Carla Shatz Professor	Biology/Neurobiology	2008-2011

Student Representatives:

Cora Ames

Kelly Zalocusky

Curriculum Committee

The Neurosciences Program Curriculum Committee is responsible for setting policies and guidelines with respect to the Program's curriculum requirements.

Name	Department	Term
Paul Buckmaster Associate Professor	Comparative Medicine	2006-2009
Russ Fernald Professor	Biology	
Miriam Goodman *Chair*, Associate Professor	Molecular and Cellular Physiology	2006-2009
John Huguenard Professor	Neurology and Neurological Sciences	2006-2009
Karen Parker Assistant Professor	Psychiatry and Behavioral Sciences	
Kang Shen Associate Professor	Biology	
Krishna Shenoy Associate Professor	Electrical Engineering	2006-2009

Admissions Committee

Katrin Andreasson	Neurology and Neurological Sciences

Associate Professor	
Marion Buckwalter Assistant Professor	Neurology and Neurological Sciences
Luis de Lecea Associate Professor	Psychiatry and Behavioral Sciences
Craig Garner Professor	Psychiatry and Behavioral Sciences
Eric Knudsen, Chair *Chair*, Professor	Neurobiology
Brian Knutson Associate Professor	Psychology
Michael Lin Assistant Professor	Pediatrics
Tirin Moore Associate Professor	Neurobiology
Karen Parker Assistant Professor	Psychiatry
Jennifer Raymond Associate Professor	Neurobiology
Anthony Ricci Professor	Otolaryngology/Head & Neck Surgery
Kang Shen Associate Professor	Biology
Yanmin Yang Associate Professor	Neurology and Neurological Sciences

Student Representatives:

Cora Ames
Kelly Zalocusky

Student Representatives

Neurosciences student representatives organize student activities, including the annual Neurosciences Retreat, and represent student interests on the Program committees.

Jaimie Adelson
Carla Shatz Laboratory
Term: 2009-2011

Jacqueline Grant
Lawrence Steinman Laboratory
Term: 2009-2011

Cora Ames
Krishna Shenoy Laboratory
Term: 2010-2012

Kelly Zalocusky
Karl Deisseroth Laboratory
Term: 2010-2012

Journal Club Representatives

Neurosciences Journal Club representatives work with Tirin Moore to host the weekly journal club, plan professional development sessions, and schedule student presentations.

Casey Guenthner
Liqun Luo Laboratory
Term: 2010-2011

George Vidal
Carla Shatz Laboratory
Term: 2010-2011

Seminar Series Representatives

Neurosciences Seminar series representatives serve as the student voice in the planning and organization of the Neurosciences Institute seminar series.

Ryan Fox Squire
Tirin Moore Laboratory
Term: 2009-2011

Jennifer Esch
Tom Clandinin Laboratory
Term: 2010-2012

Happy Hour Representatives

Neurosciences Happy Hour representatives plan and advertise monthly program happy hours.

Dan O'Shea
Krishna Shenoy Laboratory
Term: 2010-2011

Patrick House
Robert Sapolsky Laboratory
Term: 2010-2011

Ombudsperson, School of Medicine/University

The School of Medicine's Ombudsperson provides visitors with a "protected" environment in which to discuss a problem with the assurance that no action will be taken nor will the fact of the visit or anything the visitor says be disclosed to anyone.

David Rasch
585 Capistrano Way (Mariposa House), Room 210
650.723.3682
rasch@stanford.edu

Neurosciences Student Advocate

Susan McConnell, Professor in the Biology Department, currently serves as the Program's student advocate – she can provide confidential consultation and advice regarding laboratory or Program-related issues.

In addition, the Program Director has an open door policy and is **always** available to discuss student issues.

Faculty Research Summaries

Katrin Andreasson, MD
Assoc. Prof, Neurology & Neurological Sciences
kandreas@stanford.edu
We are interested in understanding the mechanisms by which neurons die in neurodegenerative diseases. We focus on the cyclooxygenase-2 (COX-2) pathway, which is a central mediator of neuronal death in models of Alzheimer's disease, ALS, and stroke. We are investigating the function of downstream prostaglandin receptor signaling pathways in mediating COX-2 dependent neuronal death. Our long-term goal is to understand the contribution of prostaglandin signaling to neuronal injury in a wide array of neurological diseases and to develop therapeutic strategies targeting these pathways in human disease.

Stephen Baccus, JD, PhD
Assistant Professor, Neurobiology
baccus@stanford.edu
Visual processing in neural circuits of the retina, studied using multielectrode extracellular array recording, intracellular recording, two-photon imaging, and computational modeling.

Bruce Baker, PhD

Professor, Biology
bruce.baker@stanford.edu
Sex determination, sexual behavior, dosage compensation and imaginal disc development in Drosophila melanogaster, with the goal of understanding at a molecular level how these processes are brought about.

Ben Barres, PhD
Professor, Neurobiology
barres@stanford.edu
Our lab is interested in the neuronal-glial interactions that underlie the development, function, and regeneration of the mammalian central nervous system.

Helen Blau, PhD
Professor , Microbiology and Immunology
hblau@stanford.edu
Molecular and cellular mechanisms that control growth, differentiation, and apoptosis; protein-protein interactions in signal transduction; gene therapy for cardiovascular disease and cancer.

Kwabena Boahen, PhD
Associate Professor , Bioengineering
boahen@stanford.edu
Our group has two synergistic goals: to understand how brains work, which will enable us to replace damaged neural tissue, and to build computers that work like brains, which will enable us to increase computational power a million-fold. To these ends, we model brains using an approach far more efficient than software simulation: we emulate the flow of ions directly with the flow of electrons---don't worry, on the outside, it looks just like software.

Lera Boroditsky, PhD
Assistant Professor, Psychology
lera@psych.stanford.edu
Language, cognition and perception; cross-linguistic differences in thought; effects of experience on cognition and perception; plasticity.

Helen Bronte-Stewart, PhD
Associate Professor of Neurology and Neurological Sciences
hbs@stanford.edu

Anne Brunet, PhD
Associate Professor , Genetics
anne.brunet@stanford.edu
Our lab studies the molecular basis of aging, with an emphasis on the role of the nervous system in longevity. We use worms, fish, and mice to discover novel genes that regulate aging and to study the importance of these genes in the nervous system. We are particularly interested in the role of longevity genes in preserving the adult

neural stem cell pool and in preventing the decline in cognitive behaviors during aging. Our lab also explores if specific brain regions secrete factors that control the overall aging process.

Axel Brunger, PhD
Professor, Molecular and Cellular Physiology
brunger@stanford.edu
Axel Brunger's goal is to understand the molecular mechanism of synaptic neurotransmission. He is particularly interested in the structure, function, and dynamics of key players in the synaptic vesicle fusion machinery. His lab is also working on the mechanism of action of clostridial neurotoxins that target this machinery. Other projects include the ATPases of the AAA family that are involved in protein complex disassembly and degradation. A molecular understanding of these complex protein machineries may ultimately lead to new therapeutics to treat human diseases.

Paul Buckmaster, DVM, PhD
Associate Professor, Comparative Medicine
psb@stanford.edu
Mechanisms of epilepsy; circuitry of temporal lobe structures.

Marion Buckwalter, MD, PhD
Asst Professor, Neurology and Neurological Sciences and Neurosurgery
marion.buckwalter@stanford.edu
Our lab focuses on how inflammatory responses after brain injury affect neurological recovery. In the United States, there are 4 million people currently living with the effects of stroke, and another 4.3 million living with the effects of traumatic brain injury. Of the people who have had a stroke, many are disabled to the degree that they cannot work, and a significant proportion are unable to walk, feed themselves, or communicate with their families the way they could prior to their stroke. Despite this very high number of people who are suffering, there is a large knowledge gap regarding the mechanisms by which neurological recovery occurs, and not a single FDA-approved therapy available to help people recover. There is reason to think that such a therapy might be obtainable – we know that some people, especially younger ones, experience significant recovery after stroke. Animal studies, almost entirely done in young animals, also demonstrate significant recovery after neurological injury. Our goal is thus to better understand the mechanisms that contribute to recovery in the young, and how they are influenced by inflammatory responses. Once we understand this, we hope to be able to develop new therapies to help people's brains repair themselves. Current projects in the lab: TGF-beta signaling after brain injury. To understand the role of TGF-beta signaling after brain injury, we use mouse models to manipulate and image TGF-beta signaling after stroke, viral vectors to influence TGF-beta signaling in neural progenitor cells, and small molecule therapies in a time-restricted fashion. We measure the effects on functional recovery from brain injury, the cellular and molecular immune response, and cell-specific signaling pathways. The effect of small molecule neurotrophin agonists on functional recovery.

In collaboration with the Longo lab, which has developed these compounds, we are testing whether small molecule compounds that mimic NGF and BDNF can be used to improve recovery and stimulate regenerative responses after brain injury. Imaging and manipulating regenerative responses after brain injury. Constructing novel mouse models to allow for real-time imaging and manipulation of neurogenesis and oligodendrogenesis in mice as they recover from brain injury. Peripheral immune responses and brain edema after stroke. In collaboration with researchers at the Stanford Stroke Center we plan to evaluate serum samples from patients with stroke. Our goal is to understand the peripheral immune mechanisms that correlate with the development of brain edema, or swelling, and determine if there are ways to predict which patients may require more aggressive treatment for their strokes.

Pak Chan, PhD
Professor, Neurosurgery
phchan@stanford.edu
Cellular and molecular mechanisms of cell death after ischemia, trauma and neurodegeneration using transgenic and knockout strategies.

Lu Chen, PhD
Associate Professor , Stanford Institute of Neuro Innovation and Translational Neuroscience
luchen1@stanford.edu

Thomas Clandinin, PhD
Associate Professor, Neurobiology
trc@stanford.edu
Genetic and molecular mechanisms controlling the development of precise patterns of neuronal connections in the central nervous system. Functional dissection of neuronal circuits controlling visual behaviors in the fruit fly.

Corinna Darian-Smith, PhD
Assistant Professor, Comparative Medicine
cdarian@stanford.edu
Structural organization and function of peripheral and central neural pathways that underlie directed manual behavior in the nonhuman primate. Capacity of these neural pathways to compensate/adapt following specific sensory manipulations.

Luis de Lecea, PhD
Associate Professor, Psychiatry and Behavioral Sciences
llecea@stanford.edu
We use a combination of optogenetic, pharmacological, molecular and behavioral methods to map and manipulate the neuronal circuits controlling sleep, arousal and hyperarousal (i.e. stress and addiction).

Karl Deisseroth, MD, PhD
Assistant Professor, Psychiatry and Behavioral Sciences
deissero@stanford.edu

Neural stem cells, neuroengineering, adaptive plasticity, electrophysiology, two-photon imaging, animal behavior, computational modeling, neuropsychiatry, developing noninvasive technologies for focal brain stimulation.

Scott Delp, PhD
Professor, Bioengineering
delp@stanford.edu

Firdaus Dhabhar, PhD
Associate Professor,Psychiatry & Behavioral Science - Psychosocial
dhabhar@gmail.com
Although stress generally has a "bad" reputation, a short-term stress is response is nature's fundamental protective mechanism without which neither predator nor prey could survive. We are interested in identifying biological mechanisms that mediate and differentiate the recently appreciated immunoenhancing effects of short-term stress (eustress) from the well-known immunosuppressive effects of long-term stress (distress). We examine stress effects on the neuroendocrine system, and on leukocyte trafficking, innate/adaptive immunity, and cytokine gene/protein expression using models of skin immunity, surgery, and cancer.

Ricardo Dolmetsch, PhD
Associate Professor , Neurobiology
ricardo.dolmetsch@stanford.edu
We use a combination of molecular biology, microscopy, electrophysiology and stem cell biology to study the biological basis of autism. We are also interested in calcium channels and calcium signaling. Finally we are interested in developing new techniques for studying the brain.

Amit Etkin, MD, PhD
Assistant Professor, Psychiatry and Behavioral Sciences
amitetkin@stanford.edu
The overarching aim of the Etkin lab is to understand the neural basis of emotional disorders and their treatment, and to leverage this knowledge to develop novel treatment interventions. Clinical experience and data suggest that abnormalities in the regulation of emotional processing, in particular through mechanisms operating outside of awareness (i.e. implicit) are central to a range of psychopathology. Thus, our investigation of psychopathology and treatment is organized around affective neuroscience of emotion regulation. Implicit emotion regulation: A successful affective neuroscience approach to psychopathology and treatment requires understanding the basic mechanisms involved in emotion regulation. Although our initial work thus far has yielded important insights, we are far from a thorough understanding of how emotion is implicitly regulated. Ongoing work in the lab is focused on understanding the factors which govern implicit emotion regulation, the relationship between implicit and explicit regulation, and whether there are ways to improve implicit emotion regulation through training. Neural basis of psychopathology: Our recent work suggests that a deficit in implicit emotion

regulation may be a core feature of anxiety, which is evident in patients with generalized anxiety disorder (GAD), including in the context of major depressive disorder (MDD). We are also currently examining how patients with different, but related, conditions, such as post-traumatic stress disorder (PTSD) and chronic pain implicitly regulate emotion and how this reflects common versus disorder-specific neural signatures. In taking a life-span perspective on implicit emotion regulation, we are also currently studying older healthy subjects and those with geriatric anxiety or depression. Neural mechanisms of treatment: Very little is known about the mechanisms of action of existing treatments in psychiatry, which is particularly true of psychotherapy, despite the importance of this clinical tool. An important goal of the lab is understanding the neural processes involved in treatment for anxiety or depression, in terms of (a) which domains of neural/mental functions are involved, (b) how different approaches yield their effects, (c) how individual differences in capacities like emotion regulation underlie differential outcome, and (d) how the mechanisms of change with medication relate to and interact with those involved in psychotherapy. We are currently NIH-funded to study the emotion regulation mechanisms underlying exposure therapy for PTSD. Neural circuits subserving emotion: An element integral to the studies above is a delineation of the neural circuits that underlie emotion processing. We have, for example, demonstrated that the major amygdalar subregions in humans have distinct patterns of resting-state functional connectivity, which are perturbed in GAD. Ongoing work in the lab is focused on extending this mapping of circuitry important for emotion, using functional connectivity, in both healthy subjects and patients with mood or anxiety disorders.

Heidi Feldman, MD PhD
Ballinger-Swindells Endowed Professor in Developmental and Behavioral Pediatrics
hfeldman@stanford.edu

Russell Fernald, PhD
Professor, Biology
rfernald@stanford.edu
Reproduction is the most powerful selective force in evolution and we focus on how important information about sex changes the nervous system. We study how social information is transduced into cellular and molecular changes using a range of techniques from behavioral observation to molecular analyses. Since we have shown that certain brain cells containing gonodotropin releasing hormone respond to changes in social status by changing size and connectivity, we are now examining the mechanisms including the role(s) of micro RNAs as well as epigenetic processes such as methylation of regulatory genes.

Robert Fisher, PhD
Professor, Neurology and Neurological Sciences
rfisher@stanford.edu
Clinical manifestations of epileptic seizures. New technology for investigating and

treating epilepsy.

Craig Garner, PhD
Professor, Psychiatry and Behavioral Sciences
garner@stanford.edu
Cellular and molecular mechanisms of CNS synaptogenesis.

Rona Giffard, PhD
Professor , Anesthesia
rgiffard@stanford.edu
Cellular and molecular basis for neuronal and astrocyte vulnerability to ischemia; roles of chaperones, inflammation and mitochondria in cell death, modeling death pathways.

William Gilly, PhD
Professor, Biology
lignje@stanford.edu
Mechanisms involved in the cellular regulation of properties, density, and spatial distribution of voltage-gated Na and K channels and of ionotropic glutamate receptors cloned from the squid nervous system and expressed in frog oocytes and insect cells.

Gary Glover, PhD
Professor, Radiology
Gary.Glover@stanford.edu
Development of novel methods for imaging of brain function using MRI

Miriam Goodman, PhD
Associate Professor , Molecular and Cellular Physiology
mbgoodman@stanford.edu
Cellular and molecular basis of sensory mechano- and thermotransduction. We study sensation at the molecular, cellular and organismal levels, leveraging the complete wiring diagram of the C. elegans nervous system, advanced tools in classical and molecular genetics, electron microscopy, and in vivo electrophysiology.

Ian Gotlib, PhD
Professor , Psychology
ian.gotlib@stanford.edu
Neural foundations of information-processing biases in affective disorders; psychophysiology of depression; depression in children and adolescents.

Isabella Graef, PhD
Assistant Professor,Pathology
igraef@stanford.edu
Signaling and transcription in neural development.

Michael Greicius,MD, MPH
Assistant Professor of Neurology and Neurological Sciences and, by courtesy, of Psychiatry and Behavioral Sciences
greicius@stanford.edu
Dr. Greicius' research involves the use of functional MRI in conjunction with other imaging modalities to detect and characterize neural networks in healthy adults and patients with neuropsychiatric disorders. The main research objective is to develop novel imaging biomarkers that will lead to advances in the understanding, diagnosis, and treatment of disorders such as Alzheimer's disease, major depression, and schizophrenia.

Kalanit Grill-Spector, PhD
Assistant Professor, Psychology
kalanit@psych.stanford.edu
fMRI, computational and behavioral studies of visual perception.

James Gross, PhD
Professor, Psychology
james@psych.stanford.edu
Neural and autonomic bases of emotion and emotion regulation: basic processes (emphasizing relations among behavior, physiology, and subjective experience); personality correlates; health implications, with particular emphasis on social anxiety disorder.

May Han, M.D.
Assistant Professor, Neurology and Neurological Sciences
mayhan@stanford.edu

Craig Heller, PhD
Professor , Biology
hcheller@stanford.edu
Neurobiology of sleep, circadian rhythms, regulation of body temperature, mammalian hibernation, and human exercise physiology. Dr. Heller is co-director of the Center for Sleep and Circadian Neurobiology. The Center fosters multidisciplinary approaches and collaborations that will help us understand the neural mechanisms controlling arousal states and arousal state transitions, the function of sleep, and the neural mechanisms of circadian rhythms. Research on human exercise physiology focuses on the effects of body temperature on physical conditioning and performance.

Stefan Heller., PhD
Associate Professor, Otolaryngology
hellers@stanford.edu
Our interest covers the auditory pathway, focusing on the periphery (sensory hair cells), and stretch from molecular analyses (proteomics) to cellular experiments (hair cell physiology - often in collaboration with Anthony Ricci), to a more systems

approach (i.e. evaluation of the auditory function of animals carrying modified genes).

Shaul Hestrin, PhD
Associate Professor, Comparative Medicine
shaul.hestrin@stanford.edu
The main interest of my lab is to understand how the properties of neocortical neurons and the circuits they form give rise to cortical activity and function.

Ting-Ting Huang, PhD
Associate Professor , Neurology and Neurological Sciences
tthuang@stanford.edu
The role of stress response and mitochondria in neurodegeneration; identify genetic modifiers that modulate responses to oxidative stress in the mitochondria.

John Huguenard, PhD
Professor, Neurology and Neurological Sciences
John.Huguenard@stanford.edu
Neurobiology of thalamocortical oscillatory activities in epilepsy and sleep. Mechanisms of hyperexcitability, neuronal hypersynchrony, and relevant antiepileptic drug actions. Development of neocortical and thalamic networks. Computational models of realistic neural networks.

Terence Ketter, PhD
Professor, Psychiatry and Behavioral Sciences
tketter@stanford.edu
Brain imaging and pharmacological studies of emotion, mood, and temperament in healthy volunteers and persons with mood disorders.

Seung Kim, MD, PhD
Professor of Developmental Biology and, by courtesy, of Medicine (Oncology)
seungkim@stanford.edu

David Kingsley, PhD
Professor, Developmental Biology
kingsley@cmgm.stanford.edu
We are using genetics and genomics to identify specific genes and mutations that underlie new morphological, physiological, and behavioral traits during vertebrate evolution. Approaches used include genome-wide linkage mapping of recent evolutionary change in threespine stickleback fish; comparative genomics in lizards, whales, chimps, and humans; and detailed functional and regulatory analysis using transgenic, knock-out, and knock-in mice.

Eric Knudsen, PhD
Professor , Neurobiology
eknudsen@stanford.edu
Systems, circuit and synaptic mechanisms of spatial attention, studied in developing and adult owls and chickens, using behavioral, systems, in vitro slice, extracellular recording, patch-clamp recording and molecular techniques.

Brian Knutson, PhD
Assistant Professor, Psychology
knutson@psych.stanford.edu
Role of biogenic amines in modulating emotional experience. Neural substrates of incentive processing, with implications for psychiatric symptoms and decision making.

Brian Kobilka, PhD
Professor , Molecular and Cellular Physiology
kobilka@stanford.edu
G protein coupled receptors (GPCRs) are the largest family of receptors for neurotransmitters in the human genome. We study the structure and mechanism of activation of GPCRs using a variety of biochemical and biophysical approaches including crystallography, NMR and fluorescence spectroscopy.

Ron Kopito, PhD
Professor, Biology
kopito@stanford.edu
Cellular mechanisms which monitor protein biogenesis and ensure that only properly folded and assembled proteins are deployed within the cell. Genetic biochemical and cell biological approaches are used to identify the machinery involved in recognizing and destroying misfolded proteins. Molecular mechanisms of neurodegenerative diseases, particular emphasis on Huntington's disease, Alzheimer's disease ALS and prion encephelopathies

Richard Lewis, PhD
Professor, Molecular and Cellular Physiology
rslewis@stanford.edu
Calcium signaling by ion channels and cellular organelles; store-operated channels; calcium control of gene expression.

Fei-Fei Li, PhD
Assistant Professor of Computer Science
feifeili@stanford.edu
Research in the Vision Lab focus on two intimately connected branches of vision research: computer vision and human vision. In both fields, we are intrigued by visual functionalities that give rise to semantically meaningful interpretations of the visual world. In computer vision, we aspire to build intelligent visual algorithms that perform important visual perception tasks such as object recognition, scene

categorization, integrative scene understanding, human motion recognition, etc. In human vision, our curiosity leads us to study the underlying neural mechanisms that enable the human visual system to perform high level visual tasks with amazing speed and efficiency. We use psychophysics experiments, fMRI and computational modeling methods to tackle these extremely interesting yet challenging problems.

Joyce Liao,
Assistant Professor,
yjliao@stanford.edu

Michael Lin, MD, PhD
Assistant Professor of Pediatrics and Bioengineering
mzlin@stanford.edu
We have developed fluorecent proteins with drug-controllable onset for visualizing new protein synthesis and are using them to study stimulus-induced local protein translation. We are currently applying this technology to understand how proteins are locally synthesized in complex cell types such as neurons, and how this process may be disrupted in human diseases caused by mutations in protein synthesis pathways. We are also developing fluorescent reporters of signaling pathways involved in synaptic growth.

Frank Longo, PhD
Professor , Neurology and Neurological Sciences
longo@stanford.edu
Our studies are focused on elucidation of disease-related signaling mechanisms and development of novel small-molecule strategies for preventing neurodegeneration and promoting neurogenesis and neural function. Disease areas include Alzheimer's and Huntington's.

Bingwei Lu, PhD
Associate Professor, Pathology
bingwei@stanford.edu
Neural stem cell behavior; mechanisms of neurodegeneration.

Liqun Luo, PhD
Professor , Biology
lluo@stanford.edu
We use molecular genetics to understand the logic of neural circuit organization and assembly in fruit flies and mice.

David Lyons, PhD
Associate Professor (Research), Psychiatry & Behavioral Science - Psychiatry/Neuroscience/MSLS
dmlyons@stanford.edu

Bruce MacIver, PhD
Associate Professor, Anesthesia-Neurophysiology

maciver@stanford.edu
The action of CNS depressants in hippocampal and neocortical brain slices; whole cell patch clamp and field EEG recordings are used to compare and contrast anesthetic actions on synaptic currents and local cortical circuit function.

Sean Mackey, MD, PhD
Associate Professor, Chief - Pain Management Division, Pain Management
amorrow@stanford.edu
Functional and structural neuroimaging of pain from the spinal cord to brain. Central factors contributing to individual differences in pain including cognitive, emotional and decision making. Central plasticity contributing to chronic pain. Real-time fMRI learned control of brain activity and pain.

Daniel Madison, PhD
Associate Professor , Molecular and Cellular Physiology
madison@stanford.edu
Our laboratory uses electrophysiological techniques to study the mechanisms of synaptic transmission and plasticity in the mammalian hippocampus. One of the main focuses in the lab is in the study of synaptic long-term potentiation (LTP).

Merritt Maduke, PhD
Associate Professor , Molecular and Cellular Physiology
maduke@stanford.edu
Molecular mechanisms of chloride movement through channels and transporters. Integration of biophysical and electrophysiological methods.

Robert Malenka, PhD
Professor , Psychiatry and Behavioral Sciences
malenka@stanford.edu
Long-lasting changes in synaptic strength are important for the modification of neural circuits by experience. A major goal of my laboratory is to elucidate the molecular events that trigger various forms of synaptic plasticity and the modifications in synaptic proteins that are responsible for the changes in synaptic efficacy.

James McClelland, PhD
Professor, Psychology
jlm@psych.stanford.edu
Two of the main topics of research in my laboratory are dynamics of decision making and learning. I collaborate with the Newsome lab and others to understand how dynamics at the neural level lead to decisions at the level of behavior. We are also interested in the effects of experience on behavior, and how these effects are mediated by changes within the nervous system. We use behavioral experiments and computational models to address these and other issues, and we are open to collaboration with neurophysiologists.

Samuel McClure, PhD

Assistant Professor, Psychology
smcclure@stanford.edu
Mechanisms of reward learning and decision-making in humans. Methods include computational modeling and fMRI.

Susan McConnell, PhD
Professor , Biology
suemcc@stanford.edu
We are interested in how individual neurons know where they should sit in the brain and with which neurons they should form specific axonal connections. We are trying to identify and characterize the progenitor cells that give rise to neuron and the processes by which young neurons locate their correct targets among hundreds of thousands of other neurons in the brain.

Vinod Menon, PhD
Professor , Psychiatry and Behavioral Sciences
menon@stanford.edu
Theoretical and experimental systems neuroscience - dynamical basis of brain function and dysfunction; functional brain imaging of human cognition and its disruption by mental illness; timing of perceptual and cognitive processes; mathematical models of nonlinear information processing in neural systems.

Tobias Meyer, PhD
Professor, Chemical and Systems Biology
tobias.meyer@stanford.edu
Signal transduction processes that underlie synaptic plasticity. Use of fluorescent microscopy techniques to dissect the complex signaling mechanisms in dendrites that regulate channel insertion and synaptic connectivity.

Emmanuel Mignot, PhD
Professor, Psychiatry and Behavioral Sciences
mignot@stanford.edu
Our laboratory studies sleep disorders at the molecular and neurophysiological level. Most of our work focuses on the sleep disorder narcolepsy and the neuropeptide system hypocretin/orexin.

Daria Mochly-Rosen, PhD
Professor , Chemical and Systems Biology
mochly@stanford.edu
Mechanisms underlying the specificity of protein kinase C isozymes; role of protein-protein interaction in signal transduction.

Tirin Moore, PhD
Associate Professor , Neurobiology
tirin@stanford.edu
Mechanisms of visual perception and cognition; visuomotor integration; control of

movement.

Mirna Mustapha,
Assistant Professor, Otolaryngology
mirnam@stanford.edu
Our long-term goal is dedicated to understanding the genetics of deafness at the molecular level using human and mouse genetics. Our research program focuses on two main areas: neural circuit development related to thyroid hormone, and development and function of the hair cell through action of motor molecules with scaffolding proteins. Our ongoing research investigates the role of thyroid hormone for the timely coordination of a complex set of neural differentiation events in the maturing cochlea. This includes research on the mechanisms that prompt the progression of axonal projections and synapse formation. We are using mouse genetic manipulations and a variety of molecular and physiological approaches to identify new genes involved in regulating cochlear hair cell innervation. The second line of research focuses on functional characterization of myosin motors in establishing and maintaining normal hearing and/or vision. Several myosin genes are involved in syndromic and non-syndromic forms of deafness (http://webhost.ua.ac.be/hhh/) but the physiological function of other myosins remains unexplored. The discovery of new molecular motors that are involved in sensory perception and knowledge of their specific roles and cargos will lead to better understanding the differentiation and the function of inner ear hair cells. Genes encoding proteins that interact with myosins comprise another important group of deafness loci. We are using mouse genetic technology to elucidate the role of these motor molecules in hair cell function. In the long term we are interested in translating the lessons learned in mice to understanding human deafness. We anticipate that the mouse and human genetic studies will be synergistic in advancing our understanding of hearing loss.

William Newsome, PhD
Professor , Neurobiology
bill@monkeybiz.stanford.edu
Neural processes that mediate visual perception and visually guided behavior.

Anthony Norcia,
Professor, Psychology
amnorcia@stanford.edu
Our overarching research focus is on "spatial vision" --- our ability to sense the structure and layout of objects in the world through encoding contrast, pattern, motion and depth. We utilize direct, but non-invasive measures of the brain's electrical activity, Visual Evoked Potentials (VEPs), in addition to functional imaging and behavioral measures to study how the brain processes visual images. As part of our research, we develop new methods for recording and analyzing brain activity, with an emphasis on dynamics. The lab has special interesting in the role of visual experience during development, because experience during development profoundly influences brain structure and function.

Theo Palmer, PhD
Assistant Professor , Neurosurgery
tpalmer@stanford.edu
Neural precursor cells and the production of new neurons. Local cues that regulate precursor activity. How this information is used to recruit cells for CNS repair or to interrupt precursor signaling once it has gone awry in malignant growth.

Karen Parker, PhD
Assistant Professor, Psychiatry and Behavioral Sciences
kjparker@stanford.edu
Oxytocin and social behavior; stress and HPA axis physiology.

Josef Parvizi, MD PhD
Assistant Professor, NEUROLOGY
jparvizi@stanford.edu
My lab is involved in electrophysiological recording and stimulation studies in epilepsy patients implanted with intracranial electrodes. Our main emphasis is to use electrocorticography and simultaneous EEG/fMRI, and tractography methods to test hypotheses at the level of system neuroscience. We collect electrophysiological data from the human brain during various cognitive and emotional tasks. We also study seizure propagation in the human brain, and how the propagation of ictal discharges along specific neuroanatomical circuitries relate to the stereotyped behavior and or thoughts.

Anna Penn, PhD
Assistant Professor, Pediatrics-Neonatology
apenn@stanford.edu
We focus on the role of placental factors in brain development, including the influence of steroids (estrogens and progestins) and protein hormones on cerebellar and hippocampal neurogenesis and connectivity

Giles Plant, BSC (Hons), Ph.D.
Associate Professsor, SINTN
gplant@stanford.edu

Kathleen Poston, MD
Assistant Professor, Neurology and Neurological Sciences
klposton@stanford.edu

David Prince, MD
Professor , Neurology and Neurological Sciences
daprince@stanford.edu
Altered properties of neurons/synapses in models of epilepsy.

Thomas Rando, PhD
Associate Professor , Neurology and Neurological Sciences

rando@stanford.edu
Mechanisms of cell death and cell survival in muscular dystrophies; regulation of cellular antioxidant defenses; mechanism of age-related muscle atrophy; gene therapy for muscular dystrophies.

Natalie Rasgon,
Professor, Psychiatry and Behavioral Sciences
natalie.rasgon@stanford.edu

Jennifer Raymond, PhD
Associate Professor , Neurobiology
jenr@stanford.edu
The goal of my research is to determine the role of specific classes of neurons and synapses in shaping the computations performed by the cerebellum. To this end, we are using the latest molecular-genetic approaches for manipulating neural circuits in combination with the detailed behavioral and circuit-level analyses possible in the oculomotor system.

Lawrence Recht, MD
Professor, Neurology and Neurological Sciences
lrecht@stanford.edu
Our laboratory focuses on two interrelated projects: (1) assessment of glioma development within the framework of the multistage model of carcinogenesis through utilization of the rodent model of ENU neurocarcinogenesis; and (2) assessment of stem cell specification and pluripotency using an embryonic stem cell model system in which neural differentiation is induced.

Richard Reimer, PhD
Assistant Professor , Neurology and Neurological Sciences
rjreimer@stanford.edu
Molecular biology and physiology of neurotransmitter release; neuropathophysiology of lysosomal storage disorders; biosensors.

Allan Reiss, MD
Professor , Psychiatry and Behavioral Sciences
reiss@stanford.edu
Gene-brain-behavior interactions as elucidated from the study of neurodevelopmental and neuropsychiatric conditions including fragile X syndrome, Williams syndrome, Turner syndrome, velocardiofacial syndrome, autism, preterm birth and other disorders of cognition and behavior. The lab employs comprehensive multi-modal neuroimaging techniques with identification and measurement of genetic risk factors and neurobehavioral outcome. An interdisciplinary model is emphasized.

Anthony Ricci,
Professor, Otolaryngology/Head & Neck Surgery
aricci@stanford.edu

Auditory hair cell mechanotransduction and synaptic transmission.

Robert Sapolsky, PhD

Professor , Biology
sapolsky@stanford.edu
How a neuron dies during aging or following various neurological insults; how such neuron death can be accelerated by stress; the design of gene therapy strategies to protect endangered neurons from neurological disease.

Mark Schnitzer, PhD

Associate Professor, Biology
mschnitz@stanford.edu
In vivo fluorescence optical imaging and electrophysiological studies of the mammalian brain towards understanding biophysical aspects of learning and memory. We are developing and applying novel imaging approaches such as multiphoton fluorescence endoscopy for examining individual neurons and dendrites, with emphasis on experiments in awake behaving animals.

Matthew Scott, PhD

Professor , Developmental Biology
mscott@stanford.edu
Genetic regulation of animal development and human disease. 1) We study Hedgehog (Hh) signaling, which controls growth of the cerebellum, and medulloblastoma, the tumors of the cerebellum that occur when Hh signaling is inadequately controlled. 2) Niemann-Pick C (NPC) disease causes Purkinje neurons of the cerebellum to die, and we are studying mechanisms of intracellular transport that underlie normal NPC functions. 3) We have recently discovered that serotonergic signaling in the fly brain is used to control insulin release and thus control of growth, and are studying the circuitry involved as well as identifying new genes required for it. 4) We are using light-activated channel proteins to study the circuitry of Drosophila neuromuscular function and development.

Carla Shatz, PhD

Professor, Biology
cshatz@stanford.edu
The major goal of research is to discover cellular and molecular mechanisms that transform early fetal and neonatal brain circuits into mature patterns of connections during critical periods of development.

Kang Shen, PhD

Associate Professor,Biology
kangshen@stanford.edu
We are interested in understanding how synapses are formed, the final step in wiring a nervous system. In particular, the molecular mechanisms underlying synaptic specify: how neurons recognize each other and how they make decisions about forming synapses between contacting neurites during development. We use

molecular, genetic and cell biological tools to study this question in the nematode, C. elegans, which has a very simple nervous system containing only 302 neurons and approximately 6000 synapses. We are also interested in understanding how synapses are eliminated. During development, synapse formation is always accompanied by synapse elimination. It is the balance between these two events that eventually lead to the maturation of synaptic circuit. Very little is known about synapse elimination. We are using genetic approaches to study this. Another area of interest is how axons and dendrite polarity is established and maintain.

Krishna Shenoy, PhD
Associate Professor, Electrical Engineering
shenoy@stanford.edu
Neural prosthetic systems, neural basis of movement preparation and generation, population codes and sensorimotor integration.

Stephen Smith, PhD
Professor, Molecular and Cellular Physiology
sjsmith@stanford.edu
The development of novel high-resolution Imaging methods and the exploration of neural circuit connectivity and synapse molecular architectures.

Raymond Sobel, MD
Professor, Pathology
raysobel@stanford.edu
Cellular and molecular mechanisms of immune responses in the central nervous system; multiple sclerosis.

Gary Steinberg, MD, PhD
Professor , Neurosurgery
steinberg@stanford.edu
Molecular and cellular mechanisms underlying cerebral ischemia; development of neuroprotective and neurorepair strategies; stem cell transplantation for stroke.

Lawrence Steinman, PhD
Professor, Neurology and Neurological Sciences
steiny@stanford.edu
Genetics basis of autoimmune neural disease. Immunotherapy. Gene and protein microarray analysis of neurological disease. The immune response in Parkinson's and Alzheimer's Disease. The role of transglutaminase in the formation of aggregations in Huntington's Disease.

Thomas Sudhof,
Professor, Molecular and Cellular Physiology
tcs1@stanford.edu
My laboratory is interested in how presynaptic terminals are formed during synaptogenesis, how presynaptic terminals release neurotransmitters, and how

presynaptic terminals degenerate in neurodegenerative disease. To address these questions, we employ diverse approaches ranging from biophysical studies to the physiological and behavioral analyses of mutant mice.

Edith Sullivan, PhD

Professor , Psychiatry and Behavioral Sciences
edie@stanford.edu
Brain structure-function relationships in normal aging and neuropsychiatric diseases, in particular, alcoholism, Alzheimer's and Parkinson's disease. Components of cognitive, motor, and sensory processes are investigated with neuropsychological and structural and functional Magnetic Resonance Imaging techniques.

Patrick Suppes,

Professor (Emeritus), Philosophy
psuppes@stanford.edu

Stuart Thompson, PhD

Professor, Biology
stuartt@stanford.edu
Signal transduction mechanisms in neurons with the goal of better understanding how neurons process information. Signal cascades initiated by G-protein coupled receptors and regional specialization of function in neurons and the role that localized clusters of ion channels play in the processing of information by the cell.

Richard Tsien, PhD

Professor, Molecular and Cellular Physiology
rwtsien@stanford.edu
Molecular properties of ion channels in relation to function of nerve and muscle; calcium signaling and synaptic plasticity.

Anthony Wagner, PhD

Associate Professor , Psychology
awagner@stanford.edu
Cognitive neuroscience of memory and cognitive control; prefrontal cortex and medial temporal lobe function; interactions between memory systems.

Brian Wandell, PhD

Professor, Psychology
wandell@stanford.edu
Development and plasticity of signals in the human visual pathways; current emphases on reading development and cortical plasticity following retinal disease. Magnetic resonance, behavior, and computational methods.

Marius Wernig, MD, PhD

Assistant Professor, Pathology
wernig@stanford.edu

My lab is generally interested in the mechanisms that determine cell fate identity. Our focus is on epigenetic reprogramming i.e. ways to induce cell fate changes by defined factors such as the reprogramming of somatic cells into pluripotent stem (or iPS) cells. More recently, we have demonstrated that mouse fibroblasts can directly be converted to functional neuronal cells that we termed induced neuronal (iN) cells (Vierbuchen et al., 2010, Nature). The iN cells were generated through expression of the three transcription factors Ascl1, Myt1l, and Brn2. This surprising discovery opened the door to a new area of investigation. We are currently working to apply our finding to human cells, explore the molecular mechanism of the action of the three transcription factors, and determine the neuronal subtype of resulting iN cells. A long term goal is to use this method to evaluate whether iN cells can be used to model neurological diseases. In addition, the emerging iPS cell technology provides new fascinating translational applications such as patient-specific stem cell therapy or disease phenocopy through differentiation into the neural lineage. Our lab has developed new methods to generate iPS cells from human fibroblasts with defined mutations and explores various technologies to improve gene targeting in human iPS cells with a long term goal to correct disease-causing mutations. This work is made possible through a very generous CIRM grant. Another interest of the laboratory is to study self-renewal and differentiation in neural stem/progenitor cells and apply these findings to the tumor precursor cells of glioblastoma. This will shed some light into glioma generation and potentially lead to alternative treatment strategies of this devastating brain disease.

Jeffrey Wine, PhD
Professor, Psychology
wine@psych.stanford.edu
Regulation of ion channels by intracellular messengers and excitation-secretion coupling.

Tony Wyss-Coray, PhD
Associate Professor, Neurology and Neurological Sciences
twc@stanford.edu
Molecular mechanisms of neurodegeneration and Alzheimer's disease.

Yanmin Yang, PhD
Assistant Professor, Neurology and Neurological Sciences
yyanmin@stanford.edu
Elucidate biological functions of cytoskeletal organizing proteins in neurons. Define the cellular and molecular mechanisms underlying the neurodegeneration in BPAG1 null mice.

David Yeomans, PhD
Associate Professor, Anesthesia
dcyeomans@stanford.edu
Pain physiology and molecular biology; herpes vector-directed genetic alteration of sensory neurons; gene therapy for pain; cell transplantation as pain therapy.

Jamie Zeitzer, PhD
Assistant Professor, Psychiatry and Behavioral Sciences
jzeitzer@stanford.edu
My research concerns examination of human and primate circadian rhythms and sleep; notably, the neural mechanisms that underlie wakefulness and circadian photoreception. I am also involved in collaborative efforts in examining the role of sleep disruption in medical pathologies such as Alzheimer's disease, spinal cord injury, and breast cancer.

Heng Zhao, PhD
Assistant Professor, Neurosurgery
hzhao@stanford.edu
Stroke is one of the leading causes of mortality and morbidity worldwide. Despite extensive research for stroke treatment in the past several decades, few neuroprotectants have been successfully translated from basic research to clinical application. My lab is interested in developing novel therapeutic methods against stroke using various rodent ischemic models, including ischemic postconditioning, remote ischemic pre- or postconditioning, and mild to moderate hypothermia. I hope this research will eventually lead to clinical application. In addition, I am also interested in studying the interaction between brain injury and the immune system (both innate as well as adaptive), including the protective effects of splenectomy.

Neurosciences Program Graduate Students

Jaimie Dolgin Adelson/Year 3
Carla Shatz Laboratory

Ron Alfa/Year 2
Seung Kim Laboratory

Katherine Cora Ames/Year 2
Krishna Shenoy Laboratory

Monique Theresa Barakat/Year 5 (currently finishing MD studies)
Matthew Scott Laboratory

Corbett Clark Bennett/Year 2
Shaul Hestrin Laboratory

Dominic Samuel Berns/Year 1
Laboratory rotations

David Neal Bochner/Year 3
Carla Shatz Laboratory

Amy Elizabeth Braun/Year 1
Laboratory rotations

Justin Emmanuel Brown/Year 6
Sean Mackey Laboratory

Astra Shamgar Bryant/Year 2
Eric Knudsen Laboratory

Egle Cekanaviciute/Year 3
Marion Buckwalter Laboratory

Poh Hui Chia/Year 3
Kang Shen Laboratory

Kelsey Lynne Clark/Year 6
Tirin Moore Laboratory

Branden John Cord/Year 6 (currently finishing MD studies)
Theo Palmer Laboratory

Jennifer Judson Esch/Year 2
Thomas Clandinin Laboratory

Zoya Farzampour/Year 1
Laboratory rotations

Lief Ericsson Fenno/Year 3 (on leave to do MD coursework)
Karl Deisseroth Laboratory

Emily Anne Ferenczi/Year 1
Laboratory rotations

Yvette Erica Fisher/Year 1
Laboratory rotations

Lynette Caizhen Foo/Year 5
Ben Barres Laboratory

Jacqueline Leigh Grant/Year 3
Lawrence Steiman Laboratory

Logan Micail Grosenick/Year 4
Patrick Suppes and Karl Deisseroth Laboratories

Casey Jack Guenthner/Year 2
Liqun Luo Laboratory

Lisa Aila Gunaydin/Year 4
Karl Deisseroth Laboratory

Patrick Kendall House/Year 2
Robert Sapolsky Laboratory

Mariko Lynne Howe/Year 1
Ben Barres Laboratory

Jennifer Hwa/Year 6
Thomas Clandinin Laboratory

William Jinsoo Joo/Year 2
Liqun Luo Laboratory

Mridu Kapur/Year 5
Yanmin Yang Laboratory

David Kastner/Year 4
Stephen Baccus Laboratory

Matthew Tyler Kaufman/Year 6
Krishna Shenoy Laboratory

Sung-Yon Kim/Year 2
Karl Deisseroth Laboratory

Daniel Landay Kimmel/Year 6

William Newsome Laboratory

Rebecca Marie Krock/Year 1
Laboratory rotations

Christine Kyuyoung Lee/Year 2
John Huguenard Laboratory

Jonathan Chit Sing Leong/Year 2
Thomas Clandinin Laboratory

Li Li/Year 3
Richard Tsien Laboratory

Jana Lim/Year 1
Laboratory rotations

Joanna Hochberg Mattis/Year 2
Karl Deisseroth Laboratory

Sonia Mayoral/Year 6
Anna Penn Laboratory

Christine Adrienne McLeavey/Year 3 (currently on leave)
Scott Delp Laboratory

Ivan Millan/Year 1
Laboratory rotations

Kira Lin Mosher/Year 4
Anthony Wyss-Coray Laboratory

Jordan Michael Nechvatal/Year 4
David Lyons Laboratory

Daniel Joseph O'Shea/Year 2
Krishna Shenoy Laboratory

Georgia Panagiotakos/Year 4
Ricardo Dolmetsch and Theo Palmer Laboratories

Alexander Aaron Pollen/Year 5
David Kingsley Laboratory

Suraj Sunil Pradhan/Year 3
Katrin Andreasson Laboratory

Rohit Prakash/Year 3
Karl Deisseroth Laboratory

Laura Marie Prolo/Year 5 (currently finishing MD studies)
Richard Reimer Laboratory

Victoria Antonina Rafalski/Year 6
Anne Brunet Laboratory

John Anthony Ramunas/Year 5
Helen Blau Laboratory

Andreas Rauschecker/Year 4
Brian Wandell Laboratory

Jacob Matteo Rinaldi/Year 4
Jennifer Raymond Laboratory

Magali Holt Rowan/Year 4
Craig Garner Laboratory

Jana Schaich Borg/Year 5
Luis de Lecea and William Newsome Laboratories

Aysel Aslihan Selimbeyoglu/Year 1
Laboratory rotations

Ryan Fox Squire/Year 3
Tirin Moore Laboratory

Sergey Stavisky/Year 1
Laboratory rotations

Nicholas Adam Steinmetz/Year 4
Kwabena Boahen and Tirin Moore Laboratories

Gabriela Beatriz Suarez-Mier/Year 1
Laboratory rotations

Izumi Toyoda/Year 4
Paul Buckmaster Laboratory

Jessica Whei Tsai/Year 1
Thomas Clandinin Laboratory

Mariel Marques Velez/Year 7 (currently finishing MD studies)
Thomas Clandinin Laboratory

George Vidal/Year 2
Carla Shatz Laboratory

Saul Abraham Villeda/Year 6
Anthony Wyss-Coray Laboratory

Mark Jason Wagner/Year 3
Mark Schnitzer Laboratory

Tzu-Chieh Wang/Year 2
Ben Barres Laboratory

Nicholas Collins Weiler/Year 4
Stephen Smith Laboratory

Olivia Cara Winter/Year 1
Laboratory rotations

Nathaniel Shattuck Woodling/Year 5
Katrin Andreasson Laboratory

Kelly Anne Zalocusky/Year 2
Karl Deisseroth Laboratory

REGISTRATION

REGISTRATION COMMITMENT FORM

The Registration Commitment is the official University registration document and is mailed to the known addresses of all students. By following instructions enclosed with the Registration Commitment, new students may complete the entire commitment process by mail. Each student is responsible for ensuring that the University has his or her correct address. You will also receive a PIN number. With your PIN, registration for classes is done through an on-line web application called Axess.

Through Axess, you can file your registration commitments, sign up for courses, review your grades, request an official transcript, review your status regarding degree requirements, give the university your correct address, file and amend your study list, apply for housing, etc. Students can reach Axess from the Stanford Home page or through

https://axess.stanford.edu/

By far the best source of accurate information about the ins-and-outs of Axess is other neurosciences graduate students!

Complete instructions on registration procedures and payment of fees will be mailed to each student, together with a Commitment to Register. Graduate students are required by the University to register for Autumn, Winter, Spring and Summer

quarters each year until the degree is received. Registration is also required each quarter in which Stanford financial award is received. Leaves of absence require approval before departure.

The number of units for which you as a student are eligible to register depends upon the amount of funding for tuition you will receive. When you arrive at Stanford, and before you register for classes, you will need to see the Program Administrator to verify the source, amount and duration of your funding. After this has been done, you will be able to register accordingly.

The **Time Schedule** includes the University calendar, final exam schedules, information on registration procedures, payment of fees, and course listings. It is published prior to each quarter and is available at the University Registrar's Office, at 630 Serra Street.

Your **Study List** is the list of courses you are taking in a given quarter. You are required to submit your student list officially each quarter via the Axess Courses/Grades function.
Study Lists are due by 11:59 pm on the Sunday after the second week of instruction; late fees are charged for submission thereafter. Refer to the back cover of the Time Schedule for specific instruction on how to file your study list. Revisions to your study list must be made within the relevant deadlines. Changes after these deadlines are not permitted. See the Time Schedule for deadlines dates.

Students will receive a University Bill. Tuition credits are entered on this bill. Also entered are other University charges such as rent (if applicable), student fees, late fees, loans, Stanford health insurance, etc. Students receiving a fellowship through Stanford may elect to have these charges deducted from their stipend checks and automatically applied to their bill.

If your bill is incorrect, it is your responsibility to ensure that the bill is corrected and to pay the correct amount by the payment deadline. The deadline for payment of all fees not covered by a Stanford award is the day before the first day of classes.

Bills may be paid at any time prior to this date by mail or in person. Student Financial Services (723.2181) can answer any questions you have relating to your bill. Their office is located at 632 Serra Street, Suite 150.

Doctoral students are eligible for TGR status when they have been admitted to candidacy, completed all required coursework, and submitted the Doctoral Dissertation Reading Committee form. Students must complete the residency requirement of 135 units of academic credit before moving to TGR status. Students registered in TGR status must enroll each quarter in the TGR course (802 TGR Dissertation) in the department where they are conducting their research, with their advisor as the instructor.

If TGR students take courses other than 802 TGR Dissertation, they may need to pay additional tuition.

Work on the thesis, dissertation, or other remaining requirements (i.e., TGR Dissertation) must be evaluated each quarter for academic progress and graded as follows: "N" indicating satisfactory progress, "N-" for unsatisfactory progress, "S" for satisfactory completion of final quarter. A hold is placed on the registration of a student who receives an "N-" grade for two consecutive quarters. Further registration is contingent on approval of an agreement for completing degree requirements by the advisor and the Program.

ADVISING AND TRACKING OF STUDENT PROGRESS

It is the responsibility of the student to advance toward the PhD degree in a timely fashion. To help the student achieve this goal, advice and counseling will be provided to the student as follows:

During the **First Year**, each student will be assigned a faculty adviser who will meet with the student at the end of each quarter to discuss course selection and laboratory rotations.

During the **Second Year**, the student will arrange to meet formally with their Thesis Advisor at the end of each quarter to review course selection and research progress. A brief report of each meeting (date and comments) will be sent to the Program Administrator.

Before the end of the Second Year students must convene a meeting of their thesis committee, even if they are not yet prepared to qualify (see section below on Thesis Advisory Committee).

Beyond the Second Year, advice and guidance will be provided by the Thesis Committee, which will meet annually, as arranged by the student. Brief reports (date, attendees and comments) from these meetings will be submitted to the Program Administrator by the Thesis Advisor.

Student progress toward the PhD degree will be tracked by the Program Administrator.

The Program Committee will review the record of each student's progress annually in June.

PROGRAM OF STUDY

NEUROSCIENCES PROGRAM REQUIREMENTS

Two overlapping sets of requirements must be met in order to earn a PhD in Neurosciences at Stanford University. Those set by the Neurosciences Program Committee deal with the types of courses students take, the preliminary exam, and procedures for progressing towards the degree. Requirements set by the University deal primarily with advancement towards candidacy and the final University Oral Exam. The requirements of the Neurosciences Program Committee are considered first.

Formal coursework is designed to provide students with a solid foundation in several areas of neuroscience that can be built upon with more advanced courses. The formal course requirements are minimized to enable students to devote a considerable amount of time to their research, even during the first two years.

All of these courses must be taken for a letter grade (not pass/fail). Students must receive a B or better for the course to count towards their PhD degree. Students concurrently in the MD program do not receive grades for medical school courses.

A student may place-out of any of these courses by demonstrating to the instructor a command of the material presented in the course.

Each student must complete three basic requirements.

1. A. The Nervous System (NBIO 206)
This course provides an introduction to the structure and function of the nervous system, including neuroanatomy, neurophysiology and neurochemistry. Topics range from the properties of neurons to the mechanisms and organization underlying higher functions. This lecture and laboratory course is designed to present a coherent framework as a preparation for more advanced work in neurobiology. Advanced students may participate as teaching assistants in this course. **7-8 units, offered Winter Quarter 2009 (Clandinin)**

Students who wish to have the NBIO 206 requirement waived because they have taken an equivalent course elsewhere should indicate so in writing to the Course Director within the first four weeks of the Autumn Quarter. The course director will act on the student's request. The student may need to demonstrate competence in the subject material by performing adequately on a written examination administered by the director, if there is uncertainty about the applicability of the student's previous course work. Arrangements to take this exam are made on an individual basis, with the director of the course. This examination should be taken prior to the start of the Winter Quarter.

2. B. Professional Development and Integrity in Neuroscience (NBIO 300)
Required of Neurosciences PhD students every quarter through the third year of graduate work. Develops professional skills in critical assessment and oral presentation of findings from current neuroscience literature, in visual presentation of quantitative data and writing research grants. Additional topics include the role of animals in lab research, fraud in science, responsibility of authors and reviewers, science in a multicultural environment, and the relationship between student and mentor. Student and faculty presentations and discussions. A faculty mentor assists students in preparing for the literature presentations.
1-2 units, offered Autumn Quarter 2008, and Winter and Spring Quarters 2009 (Moore)

3. Distribution requirements. Each student is required to take five courses within (and at least one course in *each* of) the following three areas:

1. **Molecular, Cellular and Developmental Neuroscience**
2. **Systems, Computational, Cognitive and Behavioral Neuroscience**
3. **Translational Neuroscience**

Courses from outside the neuroscience core can satisfy the elective requirement with the approval of the Program Director and the student's Advisor.

In addition, in consultation with their Thesis Advisor and Thesis Committee, students may take the opportunity to select, from the hundreds of courses available at Stanford, additional courses that meet their specialized needs, which they can audit or take for credit.

Molecular, Cellular and Developmental Neuroscience

Information and Signaling Mechanisms in Neurons and Circuits (MCP/NBIO 258)
How do synapses, cells and neural circuits process information relevant to a behaving organism? This course will examine how phenomena of information processing emerge at several levels of complexity in the nervous system, including sensory transduction in molecular cascades, information transmission through axons and synapses, plasticity and feedback in recurrent circuits, and encoding of sensory stimuli in neural circuits.
5 units. (Baccus & Tsien)

Molecular Physiology of Membranes (MCP 255)
Examines the basic biophysical principles that govern membrane physiology and applies these principles to aid understanding a wide range of physiological processes.

4 units, offered Winter Quarter 2009. (Maduke)

How Cells Work: Energetics, Compartments, and Coupling in Cell Biology (MCP 256)
Examines the basic biophysical principles that govern cell physiology and applies these principles to aid understanding a wide range of physiological processes.
4 units, offered every Spring – offered Spring Quarter 2009 (Lewis & Maduke)

Synaptic Transmission (MCP 215)
Anatomical, physiological and biochemical basis of synaptic function in the peripheral and central nervous system. Lectures by the faculty and intensive discussions of relevant research papers.
5 units, offered Spring Quarter 2009 (Madison & Smith & Hestrin)

Molecular and Cellular Neurobiology (BIO 254)
Cellular and molecular mechanisms in the organization and function of the nervous system. Topics: cell biology of the neuron, wiring of the neuronal network, synapse structure and synaptic transmission, signal transduction in the nervous system, the molecular basis of behavior including learning and memory, molecular pathogenesis of neurological diseases.
4-5 units, offered Autumn Quarter 2008 (Luo, Shen, Clandinin)

Genetic Analysis of Behavior (MCP 216)
Advanced seminar on the findings and implications of behavioral genetics as applied to both invertebrate and vertebrate model systems. Topics will include, for example, studies of circadian rhythms, sensory systems and central pattern generators, and the course will provide both an introduction to the relevant genetic techniques as well as a historical perspective. Study of original papers, directed discussion, and student presentations. Some familiarity with introductory genetics and standard techniques in molecular biology will be useful.
4 units, offered Spring Quarter 2009 (Clandinin & Goodman)

Neuronal Biophysics (BIOSCI 217)
The goal of the course is to teach students the biophysical basis for neuronal dynamics and to allow students to use physical principles as tools for prediction of neuronal behavior. A few fundamental physical principles will be seen to give rise to a rich set of dynamical activities. Quantitative and computational techniques will be used to describe these physical principles and resulting models of neuronal dynamics.
3 units, offered Spring Quarter 2009 ? (Schnitzer)

Developmental Neuroscience (BIOSCI 258)
This seminar course will consider recent findings about the mechanisms of neurogenesis, migration, axon outgrowth, synapse formation, and synaptic plasticity during the development of the nervous system.
4 units, offered every other Spring – next offered Spring Quarter 2009 (McConnell, Garner & Shen)

Systems, Computational, Cognitive and Behavioral Neuroscience

Neural Basis of Behavior (NBIO 218)
Advanced seminar on principles of information
processing in the CNS of vertebrates, and the relationship of functional properties of neural systems with perception and behavior. Study of original papers, directed group discussion and student presentations.
4 units, offered Spring Quarter 2010 (Knudsen &Raymond)

Central Mechanisms in Visual Perception (NBIO 220)
This course reviews the neural basis of visual perception and simple forms of visually based cognition such as attention, short-term memory, decision-making and motor planning. Emphasis is placed on topics of current interest in the visual neuroscience literature.
2-4 units, offered Spring Quarter 2009 (Newsome & Moore)

Affective Neuroscience (PSYCH 251)
Focus is on theory and research in the field of affective neuroscience. Comparative and human research approaches map affective function to both neuroanatomical and neurochemical substrates.
3 units, (Knutson)

High Level Vision (PSYCH 250/NBIO 240)
Critical review of theories and ongoing research of high level vision. Topics: behavioral studies pertaining to representation of objects; generalization and invariances; learning new categories; neuropsychological deficits; properties of high level visual areas in monkeys and humans; theories and models of object and face recognition.
2 units, offered Spring Quarter 2009 (Grill-Spector)

Comparative Neuroanatomy (COMPMED 207)
The structure and function of vertebrate brains. Focus is on laboratory animals commonly used in neuroscience research, and comparisons made with the human brain. Advantages and limitations of species chosen for neurobiological and biomedical research. Introduction to neuroanatomical methods and possible mechanisms of brain evolution.
2-4 units, offered Autumn Quarter 2008 (Buckmaster & Darian-Smith)

Information and Signaling Mechanisms in Neurons and Circuits (MCP/NBIO 258)
How do synapses, cells and neural circuits process information relevant to a behaving organism? This course will examine how phenomena of information processing emerge at several levels of complexity in the nervous system, including sensory

transduction in molecular cascades, information transmission through axons and synapses, plasticity and feedback in recurrent circuits, and encoding of sensory stimuli in neural circuits.
5 units,offered Autumn Quarter 2007. (Baccus & Tsien)

Neural Systems and Behavior (BIOSCI 163/263) (graduate students register for 263)
Neuroethologists take a comparative and evolutionary approach to study the nervous system. How do brains of animals compare and how did they evolve? How are neural circuits adapted to species-typical behavior? What is the sensory world of a real animal and how does it vary from species to species? Neuroethologists use behavioral, electrophysiological, neuroanatomical and genetic tools to discover the neural basis of species specific behavior. The course is research oriented with analysis of original research publications.
4 units, offered Autumn Quarter 2007 (Fernald)

Large-Scale Neural Models (BIOE 332A&B)
Emphasis is on cortical computation, from feature maps in the neocortex to episodic memory in the hippocampus, with attention to the roles of recurrent connectivity, rhythmic activity, spike synchrony, synaptic plasticity, and noise and heterogeneity. Techniques to predict and quantify network behavior; applications to data recorded from models programmed and run in labs in realtime on neuromorphic hardware developed for this purpose
Offered Winter Quarter (Boahen). (both sections must be taken for credit)

The Neural Basis of Cognition: A parallel distributed processing approach (Psych 209 and 209a)
The neural basis of perception and attention; memory, learning, and semantic knowledge; language and reading; and action selection, planning, and problem solving. Findings from human behavioral experiments, neurophysiology, functional brain imaging, and the effects of brain disorders on performance and computational models that address these findings from the parallel distributed processing point of view will be covered.
Offered Winter Quarter (McClelland) (both sections, lecture and lab must be taken for credit)

Computational Neuroscience (NENS 220)
Introduction to computational neuroscience: models of vision, audition, and learning; self-organizing networks.
4 units, offered Winter Quarter 2009 (Huguenard)

Computational Neuroimaging (PSYCH 204A)
A seminar reviewing recent models of various neuroimaging signals including fMRI and event-related electrical potentials.
3 units, offered Autumn Quarter 2008 (Wandell)

Computational Neuroimaging: Analysis Methods (PSYCH 204B)

A lab course to develop skills in software and mathematical/statistical analysis of neuroimaging signals.
3 units, offered Autumn Quarter 2008 (Grill-Spector & Wandell)

Translational Neuroscience

Neurobiology of Disease (NENS 205)
A series of case demonstrations of selected neurological disorders; discussion of the pathophysiological basis of the disorder; presentation of the basic principles underlying modern diagnostic and therapeutic management; and a discussion of recent advances for each disease entity.
2 units, offered Winter Quarter 2009 (Reimer, Mobley & Yang)

Molecular Mechanisms of Neurodegenerative Disease (BIOSCI/NENS 267)
The aging of the human population has spawned an epidemic of neurodegenerative disorders such as Alzheimer and Parkinson disease that continues to raise ever more pressing medical and social issues. The past 10 years have witnessed a revolution in our understanding molecular mechanisms of disease pathogensis. This course will comprise an in-depth analysis, through lectures and reading based on current research literature, of the genetic, molecular and cellular mechanisms that underlie neurodegenerative diseases. The course will also include an overview of the clinical aspects of the disease through case presentations.
4 units, offered Winter 2008 (Kopito, Reimer, Wyss-Coray, So, Bronte-Stewart and Greicus)

Finally . . . the following courses, offered by different neuroscience faculty (and students), may be of interest to many neuroscience graduate students.

Strongly recommended for first year neurosciences graduate students:
Understanding Techniques in Neurosciences (NBIO 277)
2 units, offered Autumn Quarter 2008 (Kelsey Clark & Matt Carter & Saul Villeda)

Strongly recommended for students with sketchy quantitative backgrounds:
Math Tools for Neuroscience (NBIO 228)
2 units (Ilana Witten & Scott Owen)

Other courses of interest:
Selected Topics in Affective Disorders (PSYCH 234)
Not offered this year

Cognitive Neuroscience (PSYCH 202)
Last offered Spring Quarter 2007 (Garielli & Grill-Spector & Wandell)

Applied Vision and Image Systems (PSYCH 221)
Last offered Winter Quarter 2007 (Wandell)

Animals Advancing Biotechnology (COMPMED 108/208)
Next offered Autumn Quarter 2008 (Cork)
Nerve, Muscle and Synapse (BIO 267H)
Electrophysiology lab course, taught at Hopkins Marine Station.
Last offered Spring Quarter (Gilly)

Foundations of Memory (PSYCH 210)
Last offered Autumn Quarter 2007 (Wagner)

Human Behavioral Biology (BIO 250)
Last offered Autumn 2007 (Sapolsky)

Stem Cells and Gene Therapy (MI 231)
(Blau & Nolan)

Neuroeconomics (PSYCH 278)
Offered Autumn Quarter 2008 (Knutson & Rangel)

Principles of Sleep Research (BIO 249)
Last offered Spring Quarter 2007 (Heller)

Seminar on Emotion (PSYCH 261)
Last offered Winter Quarter 2007 (Gross)

Seminar on Emotion Regulation (PSYCH 268)
Last offered Spring Quarter 2007 (Gross)

Functional MRI Methods (RAD 227)
Last offered Autumn Quarter 2007 (Glover)

Stem Cell Engineering (BIOE 261/NSUR 261)
Last offered Autumn Quarter 2007 (Deisseroth & Palmer)

LABORATORY ROTATIONS

Laboratory rotations are a requirement of the program. Students will rotate quarterly through at least three laboratories during their first year before making a commitment to a thesis laboratory. Most students will have chosen a thesis laboratory by the end of the Spring quarter of the first year, after rotating in three laboratories. An additional rotation may be arranged with prior consent of the Program Director. Rotations are not limited to faculty participating in the Neurosciences Program. By mutual consent, students may rotate after the first quarter with any faculty member in the biomedical sciences as part of our flexible admissions program.

Research rotations are an important part of the graduate training program. Rotations enable students to make, confirm or modify career decisions based on research experience. Rotations allow students to experience the intellectual and laboratory atmosphere of at least three lab groups and become familiar with invaluable experimental approaches and techniques. In addition, students form friendships with faculty members, as well as with students and postdocs in their laboratory, who often become lifelong scientific collaborators.

It is the student's responsibility to contact appropriate faculty members about rotation opportunities.

At the end of each quarter, students will meet with the First Year Advisor to discuss rotations for the subsequent quarter.

Students rotating or carrying out thesis research in a School of Medicine department register for the graduate research course and faculty section number of that department.

LABORATORY SELECTION

Final selection of a laboratory for PhD thesis research will be made only after consultation with the faculty in question and with the Program Director and no earlier than the end of the Winter quarter of the first year. The selected Thesis Advisor must notify the Program Director and Program Administrator indicating his/her agreement to mentor the student towards a PhD and indicating financial support, if the student is not on a training grant and does not have an individual fellowship.

As part of the flexible admissions program, students may switch to another PhD program if their interests change in the first year. This will have to be arranged with the prospective Thesis Advisor and Department or Program.

THESIS ADVISORY COMMITTEE

After deciding on a Thesis Advisor the student and Thesis Advisor shall select a Thesis Advisory Committee. We strongly suggest that the Committee be selected by the end of winter quarter of the second year. Under no circumstances shall the Committee be selected later than the end (typically summer quarter) of the second year.

The student and Thesis Advisor will choose three individuals who they consider to be best able to judge the scientific content of the thesis; the Thesis Advisor will chair the Committee for all meetings with the exception of the Qualifying exam which will be chaired by another member of the Committee. Given the interdisciplinary nature of neuroscience research in general, and the diverse interests of our faculty, **the Thesis Advisory Committee will be composed of faculty from more than one department, and it's composition must be approved by the Program Director.**

These three individuals, together with the student's advisor, shall constitute the Thesis Committee. **The student will arrange an initial meeting of the Thesis Committee by the end of the student's second year (see Advising and Tracking of Student Progress).** The Qualifying Examination may or may not be taken at this first meeting (see Qualifying Examination). After this initial meeting, the Thesis Committee will meet **at least once a year** to monitor the student's progress in research**. It is the responsibility of the student to organize these annual meetings.** In advance of each meeting the student shall prepare a 1-2 page summary of progress made on the thesis project. Copies of this summary should be sent to the members of the Thesis Committee.

The Thesis Committee functions to review the progress of the thesis research, to identify potential problems at an early stage, and help to channel the research in a fruitful direction (see Advising and Tracking of Student Progress). In the rare chance that the Thesis Advisor and Thesis Committee find that the student is unable to make sufficient progress towards completion of the thesis, they shall inform the Program Director in writing. Unsatisfactory progress towards completion of the PhD degree will be considered grounds for dismissal
from the Program.

QUALIFYING EXAMINATION

The goal of the Qualifying Examination is to determine the student's preparedness to pursue research on a thesis topic, explore whether potential problems have been considered, assess the student's ability to think, and the student's familiarity with relevant background information and alternative experimental approaches.

The Qualifying Examination should be taken by the end of the student's second year in the Program. An extension must be granted by written permission from the Program Director. Exceptions are allowed for combined MD/PhD students. Failure to complete the Qualifying Examination by the end of the third year will be considered grounds for dismissal from the Program.

The Qualifying Examination will consist of an oral examination given by the Thesis Advisory Committee, *and will be chaired by a member of the Committee that is not the Thesis Advisor*. A written version of the thesis proposal should be distributed to the committee members at least one week prior to the exam. The student is encouraged to meet each member of the Thesis Committee in advance in order that both shall be clear about the scope of the examination.

The intent of the examination is to ensure that:

1. The student has selected a good thesis topic and is qualified to undertake the study. The student is required to prepare, beforehand, an approximately 10-page thesis proposal in the format of an NRSA postdoctoral proposal.

2. The student is able to discuss topics related to the background information relevant to the proposal. A typical exam begins with a prepared presentation of the thesis proposal. Faculty will frequently interrupt with questions about the work, its interpretation, the methods, and background questions relevant to the proposal.

Following the exam, the Chair of the Thesis Committee will send a copy of the student's proposal and a short appraisal of the student's performance on the exam, including the decision of the committee, to the Program Administrator.

After successful completion of the Preliminary Examination, the student may apply for admission to candidacy. In the event that the student does not pass the Preliminary Examination, the Thesis Committee will meet together with the Program Director to consider whether extenuating circumstances warrant permitting the student to be examined a second time. If so, the Thesis Committee will decide upon a time and a format for the second examination. If the student is not given an opportunity to take a second examination, or if he or she is given such an opportunity and fails the second examination, he or she will be dismissed from the program (see Dismissal from the Program). The dismissal shall be made in writing.

ADMISSION TO CANDIDACY

Admission to candidacy means that the student has completed the Qualifying Examination and most of the course requirements of the Neurosciences Program and is now ready to begin thesis research leading to a dissertation and University oral exam. The Application for Candidacy for Doctoral Degree Form must be filled out and submitted to the Program Administrator. The schedule will be adjusted to fit the needs of MSTP and MD/PhD students, or students who switch from another program.

DISSERTATION AND ORAL EXAM

Please refer to University Requirements for details of process and procedure.
It is anticipated that the PhD program will be completed in five years, although it is possible to complete it in four years. However, it is recognized that exceptional circumstances do arise and that additional time may be necessary. At such time as the student and Thesis Advisor are agreed that the student has carried out research of adequate quality and quantity, it shall be written up, following University regulations, in a dissertation.

The dissertation will be evaluated by the Reading Committee, which must be approved by the Director of the Program. In the Neurosciences Program, the Reading Committee has generally been one and the same with the Thesis Committee, although changes in membership can be made at the desire of the faculty member or student. The Reading Committee shall consist of the Thesis Advisor plus three additional members. At least two of the additional members must be on the Academic Council.

A Doctoral Dissertation Reading Committee Form must be filed in the Neurosciences Program Office before the oral examination. The student will provide each member of the Reading Committee with a typed draft of the thesis at least 2 weeks in advance. This will not be the student's first draft, but it need not be a polished finished product — the examiners must be able to read it easily and it must have all the figures and tables of the final version. When the Reading Committee is satisfied that the thesis represents an appropriate piece of work, the student and Thesis Advisor shall arrange for presentation of the thesis in an open, announced seminar and for its defense before the Examining Committee in the University Oral Examination. **The University Oral Examination Schedule Form, detailing the composition of the Examination Committee and time of exam, must be submitted to the Administrator of the Program at least three weeks prior to the proposed examination date.** Include an abstract of the dissertation proposal. This should allow sufficient time to provide the Committee Chair with necessary information and to send announcements to the *Stanford Report*.

UNIVERSITY ORAL EXAMINATION

The University oral examination is a requirement of the PhD program. At the time of the exam the student's candidacy must be valid and the student must be registered in the quarter in which the exam is taken. The purpose of the exam is to test the candidate's command of the field of study and to confirm fitness for scholarly pursuits. The exam will be administered according to the following guidelines based on both University and Program requirements:

1. The Examining Committee shall consist of five members: four examiners (three of which must be on the Academic Council) and a Chair. The four members of the Thesis Advisory Committee should typically constitute the Examining Committee. One of the required examiners may be an individual who is not on the Academic Council, if he or she contributes an area of expertise not readily available from the faculty and if approved upon petition to the Degree Progress Office.

2. The Chair of the Examining Committee must be an Academic Council member and cannot come from the same department as either the student candidate or the principal advisor, but may be a member of the Neurosciences Program. Departmental affiliation of the Chair and Thesis Advisor includes joint appointments; courtesy appointments do not affect eligibility. The Chair can be from the same department as members of the Examining Committee other than the Thesis Advisor. The ultimate responsibility for appointing a Chair rests with the Program Director, although the student and Thesis Advisor are in the best position to arrange this. The student should make certain that their choice of Chair meets the University criteria by double-checking with the Program Administrator or Director. The composition of the Examining Committee must be approved by the Director of the Neurosciences Program.

3. The Program Administrator will provide the Chair with a University Oral Examination schedule, University Guidelines for Oral Examinations Procedures, an abstract of the dissertation, and ballots.

4. Following the public seminar, the Examining Committee will continue the examination of the candidate (in private) on the same day for a period not to exceed two hours.

5. At the end of the examination the Committee members, without the student present, shall vote on the student's performance in a secret ballot. At least 4 votes out of a possible 5 (or 4 out of 6, or 5 out of 7, or 6 out of 8) are required for a passing grade.

6. The oral examination results are validated by the Chair and must be reported to the Program Administrator and the Degree Progress Office within five days of the examination.

7. University procedures are followed in communicating with students who do not pass the examination. Copies of this correspondence will continue to be sent to the Degree Progress Office.

The Committee members may wish to make suggestions regarding the dissertation; the student will incorporate the required alterations into the final version of the dissertation. The Reading Committee will append their signatures to this final version, if it meets with their approval. The dissertation may then be submitted to the University Degree Progress Office.

MASTER'S DEGREE

A Master's Degree in Neurosciences is awarded only as a terminal degree from the Program.
The requirements for completion of a Master's Degree are the following:

1. Satisfy the unit and residency requirements set by the University for a Master's Degree.

2. Complete of the course requirements for the Ph.D. degree with a grade of B or better.

3. Pass a Master's Examination that consists of the presentation of a five-page research proposal on a topic that the student may or may not intend to pursue. The proposal may be the same as one written in partial fulfillment of a graduate course taken by the student. The quality and scholarship of the proposal and the student's performance in the Graduate Program will be evaluated in an examination to be conducted by 3 members of the Neurosciences Faculty.

UNIVERSITY REQUIREMENTS

The University requirements for the PhD degree are detailed below. These requirements deal primarily with:

1. The minimal number of units of coursework required.

2. Steps that must be taken in order for the student to "advance towards candidacy" for the PhD.

3. The minimal number of quarters at full-tuition that the student is in "residence" at Stanford.

4. The final University Oral Exam.

Unit requirements. There are no specific course requirements. Candidates for the PhD degree must satisfactorily complete a program of study that includes 135 units of graduate coursework, reading and/or research. The *Stanford Bulletin* should be consulted for rules concerning transfer credit and other details.

Students in the program will ordinarily register for four quarters each year.

Advancing to candidacy. Students are expected to be "admitted to candidacy" once they have completed the Program's qualifying procedures, usually by the end of the second year of doctoral study.

Admission to candidacy is an acknowledgment of the student's potential to complete the requirements for the PhD successfully.

An "Application for Candidacy" must be filed by the end of Summer quarter of the second year in the Program in order to be admitted to candidacy for a PhD degree by Stanford University.

The information contained on the form is forwarded to the Degree Progress Office of the Registrar's office and indicates that the student is formally qualified for the PhD degree and is in good standing. It implies that the Program has made a careful review of the student's progress. The form requires a listing of Stanford coursework totaling at least 72 units. It indicates that the student has completed the qualifying examination and shows that he or she is still required to complete a Dissertation.

Doctoral students are expected to complete their degree requirements in a timely manner. Therefore, candidacy is valid for five years unless terminated by the Program for unsatisfactory progress. The Program expects that generally all graduate students will complete their dissertation research within five years of entrance into the Program.

PhD THESIS AND ORAL EXAMINATION

When the student, Thesis Advisor, and Advisory Committee agree that the student has completed work of sufficient novelty and quality to merit the PhD, the student will write a dissertation. When the dissertation is acceptable to the advisor, it will be presented to the Oral Exam Committee. The student will then defend this dissertation at the University oral examination.

University oral examination. This requirement for the PhD degree was detailed previously. A summary of the paperwork involved is as follows. Once the student and

Thesis Advisor have agreed on a Reading Committee, the names of the faculty on this committee shall be submitted to the Neurosciences Program Office on the Doctoral Dissertation Reading Committee Form. The date for the oral examination, which begins with a research seminar, should be scheduled and this information submitted to the Neurosciences Program Office on an Oral Examination Schedule Form. An abstract of the thesis is required at the same time. Both the Doctoral Dissertation Reading Committee Form and the Oral Examination Schedule Form must be received in the Neurosciences Program office at least three weeks before the scheduled date of the exam. The oral examination results are validated by the Chair and reported to the Program and the Degree Progress Office within five days of the examination.

Doctoral dissertation. The Doctoral dissertation is expected to be an original contribution to scholarship or scientific knowledge, to exemplify the highest standards of the Neurosciences, and to be of lasting value to the intellectual community. Students should refer to the booklet "Directions for Preparing Doctoral Dissertations", available online at:

http://registrar.stanford.edu/pdf/docdissdir.pdf

These guidelines should be read carefully before final preparation of the manuscript to avoid costly and time-consuming revisions. Previously published dissertations should not be used as a guide to preparation of the manuscript. Each member of the Reading Committee must sign the signature page of the dissertation to certify that the work is of acceptable scope and quality. One reading committee member reads the dissertation in its final form and certifies on the Certificate of Final Reading that specifications of the Neurosciences Program and of the University have been met.

The dissertation, signature page signed by the Reading Committee, and a signed publication agreement (to be completed by the Research Advisor), must be submitted to the Degree Progress Office. The student must apply for conferral of a graduate degree by filing an Application to Graduate (on Axess) before the deadline of the term. Once the dissertation, the signed publication agreement, and the Application to Graduate are submitted, the Degree Progress Office will begin the administrative process that results in the conferral of the PhD degree in Neurosciences, and the student may begin postdoctoral work.

Conferral of degrees. Deadlines for submission of dissertations are strictly enforced. Students who submit their dissertations after the deadline in a given quarter may obtain a Statement of Completion from the Degree Progress Office; official degree conferral will occur in the following quarter. You must be registered for the quarter in which the degree is conferred or the immediately preceding quarter. Candidacy must be valid when the degree is conferred.

The Degree Progress Office should be notified in writing when conferral plans change. Students who withdraw their conferral request or who fail to complete degree

requirements must file a new Notice of Intention for a subsequent quarter. A new Notice of Intention must be filed for each degree and conferral quarter.

Application to graduate. The Application to Graduate is submitted on-line via the student web application called Axess. It should be submitted by the deadlines listed in the University Calendar. Requests for conferral are reviewed by the Neurosciences Program Office and the Degree Progress Office to verify completion of degree requirements. In Summer, Autumn, and Winter Quarters degree certificates are sent to students within two weeks of the conferral date.

Spring commencement. Commencement ceremonies are held each June for students who have received degrees in the previous Summer, Autumn, Winter quarters and for students who are graduating in June. Students completing programs in June must submit a Notice of Intention by diploma deadline date to receive a diploma at June Commencement and to have their names appear in the Commencement Bulletin.

Information on Commencement activities and distribution of diplomas is sent by the Registrar's Office in early April to addresses provided on the Notice of Intention. Students who wish to participate in commencement activities in advance of conferral of their degree may obtain a Graduate Student Petition to Walk Through Commencement Exercises from the Degree Progress Office from May 1 until the day before commencement. A Walk- Through petition should be requested only if there is no possibility of completing degree requirements for June conferral.

HONOR CODE

The Honor Code is the standard of academic conduct for Stanford students. The fundamental Standard has set the standard of conduct at Stanford since 1896. It states:

Students at Stanford are expected to show both within and without the University such respect for order, morality, personal honor and the rights of others as is demanded of good citizens. Failure to do this will be sufficient cause for removal from the University.

A. The Honor Code is an undertaking of the students, individually and collectively:

1. That they will not give or receive aid in examinations; that they will not give or receive unpermitted aid in class work, in the preparation of reports or in any other work that is to be used by the instructor as the basis of grading.

2. That they will do their share and take an active part in seeing to it that others as well as themselves uphold the spirit and letter of the Honor Code. This includes reporting an observed dishonesty in an examination to the course instructor.

B. The faculty, on its part manifests its confidence in the honor of its students by refraining from proctoring examinations and from taking unusual and unreasonable precautions to prevent the forms of dishonesty mentioned above. The faculty will also avoid, as far as is practicable, academic procedures that create temptations to violate the Honor Code.

C. While the Faculty alone has the right and obligation to set academic requirements, the students and faculty will work together to establish optimal conditions to honorable academic work.

The complete text of the Honor Code is printed in the annual *Stanford Bulletin*.

FINANCIAL AID

Stipends, RAships, and tuition. Students are fully funded for their entire course of study, assuming satisfactory progress toward the PhD degree. Students normally enter the Program on a Neurosciences Program training grant slot or with individual fellowships. Once a student joins a laboratory, he/she becomes the financial responsibility of the Principal Investigator of that laboratory for the duration of the student's PhD research. Occasionally, students are fully funded on entry by a research assistantship (i.e., on a faculty member's research grant) that includes payment of a stipend and tuition. Often, it will be a combination of these sources.

Students are required to apply for predoctoral fellowships from the National Science Foundation and the National Defense Science and Engineering Graduate Fellowship Program (NDSEG) by November of their first year in residence. These individual fellowships will pay a stipend and tuition for 3-4 years. Applications for both are available in October and due in the first week of November.

Loans and external awards. Graduate students who believe they will require loan assistance can apply for federal Stafford Student Loan, Federal Perkins Loan, and University loan programs. Inquiries for publications outlining loan program terms can be directed toFinancial Aid Office, Bakewell Building, 355 Galvez Street; financialaid@stanford.edu; 650.723.3058. International students who are not permanent residents are not eligible for long-term loans.

Graduate Fellowships awarded by external sources (i.e., NSF and Ford) are administered at 355 Galvez Street.

Contact: Maureen Grey
Phone: 725.0868
Email: mogrey@stanford.edu

The NIH and NIMH training grants provide the Program with only partial stipend. The research assistantship supplements this deficiency.

All students appointed and supported by one of the Program's training grants will be informed of the period of their appointment and the amount of funding awarded during their appointment.

Stipends. The stipend for Neurosciences students for the 2010-2011 academic year has been set at $29,500 (if paid as a quarterly stipend) or $30,136 (if paid in the form of an assistantship) regardless of the specific department in which they are rotating or carrying out thesis research. Students may, of course, receive more than this amount if they receive an individual fellowship that is set at a higher level.

Student fees, late fees, etc., are the responsibility of each student, though some fees may be covered through the funding received. Students may receive stipends quarterly (from fellowships and training grants) or salary twice-monthly (from research assistantships).

For those students on fellowships who are paid quarterly, stipend checks are issued the day before classes begin. Checks for students who have not set up direct deposit are sent to the students' local US mailing address listed in Axess.

Students who are paid semi-monthly through the Stanford University Payroll Office will be paid on the 7th and the 22nd of the month (or on the preceding work day if these dates fall on a weekend or holiday). Semi-monthly paychecks may be direct-deposited in local banks. "Live" checks are sent to the student's campus mailcode (typically the student's thesis lab) entered into Axess by the Program Administrator. Students may enroll in Payroll Direct Deposit and view semi-monthly pay statements in Axess.

Doctoral candidates are expected to be full-time students. Outside employment is strongly discouraged and should be discussed with the Program Director.

Tuition. For the 2010-2011 year, tuition is $8,390 per quarter for 8-10 units and $12,900 per quarter for 11-18 units.

Your tuition award on your University bill will be reflected as a credit based on the tuition that is provided from your fellowship, training grant and/or research assistantship. These credits should take care of the student's tuition needs.

Taxes. Tax Information (limited) is available in:

1. The Graduate Student Handbook.
2. The Bechtel International Center (for international students)

Time Table for Advancement to Ph.D.

Year One

- Quarterly laboratory rotations/rotation evaluations
- Take courses
- Select laboratory and thesis advisor

Year Two

- Begin thesis research
- Take courses
- Meet quarterly with thesis advisor
- Select thesis advisory committee (three members (in addition to your advisor)) by the end of Winter quarter – this committee must be approved by the Program Director
- Take qualifying examination
- Submit:

Qualifying Examination Certification
http://neuroscienceprogram.stanford.edu/students/StudentDocuments/Quals%20Form.pdf
Application for Candidacy for Doctoral Degree
https://www.stanford.edu/dept/registrar/pdf/appcanddoct.pdf
Doctoral Disseration Reading Committee Form
https://www.stanford.edu/dept/registrar/pdf/docrdngcomm.pdf

Year Three

- Thesis research
- Take courses
- Meet with thesis committee

Year Four

- Thesis research
- Meet with thesis committee
- Apply for TGR status in Spring (usually)

http://www.stanford.edu/dept/registrar/pdf/tgrreq.pdf

Year Five

• Thesis research
• Oral examination:
University Oral Examination Schedule
https://www.stanford.edu/dept/registrar/pdf/oralsform.pdf
• Submit thesis
http://registrar.stanford.edu/pdf/docdissdir.pdf
• Apply to graduate

Links

Official Program Website
http://neuroscienceprogram.stanford.edu/

Journal Club
https://neuroscienceprogram.stanford.edu/evals/

Seminar Schedule
http://nis-seminars.stanford.edu/

Academic Calendar
http://registrar.stanford.edu/academic_calendar/

Cardinal Care
http://www.stanford.edu/group/vaden/insurance/cardinalcare.html

A Guide for New Graduate Students
http://registrar.stanford.edu/pdf/gradstuguide.pdf

Housing Assignments
http://www.stanford.edu/dept/rde/has/

Office of the Registrar
http://registrar.stanford.edu/index.htm

Student Financial Activities
http://fingate.stanford.edu/students/index.html

Fellowships
NSF: https://www.fastlane-beta.nsf.gov/grfp/Login.do
NDSEG: https://www.asee.org/ndseg/
NRSA: http://grants.nih.gov/training/nrsa.htm

Stanford Neurosciences Graduate Program

QUALIFYING EXAMINATION CERTIFICATION

_____ _____

Candidate Date of Examination

The advisory committee of the student named above certifies that the student passed the Qualifying Examination by demonstrating a breadth of knowledge in the field of Neurosciences and a depth of knowledge in the chosen field of specialization to qualify for candidacy and to pursue PhD thesis research.

_____/_____

Committee Chair Date

_____/_____

_____/_____

_____/_____

How To Finish Up...

There are three administrative hurdles to finishing up: arranging for your defense, submitting your dissertation, and applying to graduate. In addition, in some cases it may be possible to adjust your tuition to a nominal level for your final quarter. The following should cover the majority of the issues involved – remember to also read the relevant sections in the Student Handbook.

The Defense

In our Program, after a student's committee agrees on the time and date of his/her defense, the student him/herself makes the arrangements for the room. Munzer Auditorium, Clark Center Auditorium and M106 in the Alway Building are all good choices. Some students wish to arrange for a smaller, more intimate room for the post-public-defense examination, and some students just stick with the larger hall for that portion of their defense.

To schedule the Clark Center Auditorium, visit this page:

http://biox.stanford.edu/room_scheduling.html

To schedule Munzer, contact:

Jane Kroeten
jkroeten@stanford.edu
723.8423

To schedule other conference rooms in the Medical School (such as Alway M106), we *believe* you should contact:

Toni Montoya
montoya@stanford.edu
723.6952

Once the date and room have been arranged, then there are two more administrative steps: the defense needs to be publicized, and the Program's administrator needs to deliver a packet of information to the professor who will chair the defense. Remember that the Chair of your defense committee must not be a member of the same department as your PI.

Both of these steps require that the student complete and submit to the administrator the University Oral Examination Form:

http://www.stanford.edu/dept/registrar/pdf/oralsform.pdf

email his/her one page abstract, and email the location of the post-defense meeting (if it'll be held in a separate room) three weeks in advance of the defense date.

The administrator will:
a)send an announcement to the Stanford Report so that (if at all possible) it appears in the edition immediately preceding the defense.
b) send an email announcement to the neurosciences community a week before the defense date, and a reminder very close to the time of the defense.
c) arrange for a poster advertising your defense to be posted around the Medical School campus – if you'd like have a poster put up, please email it as an attachment to larkspur@stanford.edu two weeks before your defense.

and

d) include an announcement in the Biomedical Seminars Calendar:

http://med.stanford.edu/seminars/

The administrator will deliver the defense packet to the chair two weeks in advance of the defense.

If you are planning to defend, submit your dissertation and graduate all in one quarter, bear in mind that your defense can *potentially* be scheduled for any date during the quarter up until right before each quarter's deadline for dissertation submission. It's taking a risk to wait until the last moment (as discussed in the next section), but you can always refer to the academic calendar for the relevant dates:

http://registrar.stanford.edu/academic_calendar/

Submitting Your Dissertation

The student should schedule a "dissertation format check" appointment with the Degree Progress officer (email with request to registrar@stanford.edu), and make an appointment for the actual submission. This document:

http://registrar.stanford.edu/pdf/docdissdir.pdf

is the official guide to the process. Please read it carefully! A couple of important reminders:

While you *can* wait until just before the deadline to do all of this, the Registrar's office is quite serious when they say that they'll stick to the stated deadline – it really makes

sense to pursue the review and submission of your dissertation in a timely manner, so that any issues can be resolved before it becomes a down-to-the-last-minute crisis.

Also, the Degree Progress officer will review your status in Peoplesoft, and contact the Program administrator to update any milestones that are still to be completed online.

Finally, notice that you need to request your own copy or copies of the dissertation – in the normal course of events, only the copies for the University are created.

Apply to Graduate

Refer to the academic calendar (see link above) for each quarter's deadline to apply to graduate in Axess.

The defend/submit dissertation/apply to graduate process can all be done in one quarter – it's also not unusual for a student to defend in a given quarter, but still need time to finish up his/her dissertation in the following quarter. MD/PhD students may decide to defend, but not submit their dissertation until they're finishing up their MD work.

Reducing Tuition

If you will be defending in one quarter, and then submitting your dissertation/applying to graduate in the following quarter, you can reduce your tuition for that final quarter to a nominal $100 (and, assuming that you're being supported by your PI, make her or him very happy) by submitting the following form:

http://registrar.stanford.edu/pdf/grad_qtr.pdf

Please bear in mind that this form needs to be submitted before the first day of classes of that final quarter.

Other Stuff

If you're being supported by an NRSA, we'll need to submit a termination form to close out your support as of the end of your graduate quarter, unless you'll be leaving your lab to start new work at another institution before the end of the quarter. The exception to this will be those students who are supported by an F30 NRSA (for MD/PhD fellows).

Depending on your plans for the period immediately following your defense/submission of your thesis, we'll either be closing down your paylines as of the end of your graduation quarter (unless you're an MD/PhD student who'll be returning to his/her MD work) or (in the event that you are being supported by an assistantship and will be leaving your PIs lab immediately following the submission of your thesis to begin other work) at some point during the quarter – if you'll be doing postdoctoral work on campus, please talk with the relevant department administrator well in advance to make sure that the transition to being paid as a postdoc is a smooth one.

Whatever you'll be doing after the day you drop off your dissertation, we'd like to know – please let us know if you'll be moving immediately into postdoctoral work, are going to be joining the outside-of-academia workforce, or are planning to take a year off and surf in Australia.

We'll be removing your email account from the neurostudents mailing list. If you'll be doing postdoctoral work on campus, we'll add you to the postdocs mailing list. If you'll be leaving campus, but would like to be kept up-to-date on Program announcements, let us know, and we'll add you to the neurolist mailing list.

Please don't hesitate to call (723.9855)/email (larkspur@stanford.edu) or visit the Program office with any questions about any of the above – I may not have the answer at hand, but can usually track it down reasonably quickly.