Neurosciences

DIRECTOR, NEUROSCIENCES GRADUATE PROGRAM

Anirvan Ghosh, Ph.D., *Biology*

PROFESSORS

Henry Abarbanel, Ph.D., *Physics*
Thomas Albright, Ph.D., *Adjunct/Psychology and Neurosciences*
Ursula Bellugi, Ed.D., *Adjunct/Psychology*
Darwin K. Berg, Ph.D., *Biology-Neurobiology Section*
Karen Britton, M.D., Ph.D., *In-Residence/Psychiatry*
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Edward M. Callaway, Ph.D., *Adjunct/Neurosciences and Biology*
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Paul A. Insel, M.D., *Pharmacology and Medicine*
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William B. Kristan, Ph.D., *Biology and Adjunct/Neurosciences*

Ronald Kuczenski, Ph.D., *In-Residence/Psychiatry and Adjunct/Neurosciences*
Marta Kutas, Ph.D., *Cognitive Science and Adjunct/Neurosciences*
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Greg Lemke, Ph.D., *Adjunct/Neurosciences*
Stuart A. Lipton, M.D., Ph.D., *Adjunct/Neurosciences*
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Roberto Malinow, Ph.D., *Professor/Neurosciences*
Athina Markou, Ph.D., *In-Residence/Psychiatry*
Maryann Martone, Ph.D., *In-Residence/Neurosciences*
Eliezer Masliah, M.D., *Neurosciences and Pathology*
Pamela Mellon, Ph.D., *Neurosciences and Reproductive Medicine*
Arnold L. Miller, Ph.D., *Emeritus/Neurosciences-Neurobiology Section*
Ulrich Mueller, Ph.D., *Adjunct/Neurosciences*
Robert R. Myers, Ph.D., *Emeritus/Anesthesiology and Pathology*
R. Glenn Northcutt, Ph.D., *Neurosciences*
Daniel T. O'Connor, M.D., *In-Residence/Medicine*
Dennis O'Leary, Ph.D., *Adjunct/Neurosciences and Biology*
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Barbara Ranscht, Ph.D., *Adjunct/Neurosciences*
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Michael G. Rosenfeld, M.D., *Medicine*
Allen F. Ryan, Ph.D., *Surgery and Adjunct/Neurosciences*
David P. Salmon, Ph.D., *In-Residence/Neurosciences*
Massimo Scanziani, Ph.D., *Neurobiology*
Nicholas Schork, Ph.D., *Adjunct/Psychiatry*
Gary Schulteis, Ph.D., *In-Residence/Anesthesiology*
Terrence J. Sejnowski, Ph.D., *Biology-Neurobiology Section and Adjunct/Neurosciences, Cognitive Science, Computer Science and Engineering, and Physics*
Linda Sorkin, Ph.D., *Anesthesiology*
Nicholas C. Spitzer, Ph.D., *Biology-Neurobiology Section*
Larry R. Squire, Ph.D., *Psychiatry, Psychology, Neurosciences*
Charles Stevens, M.D.,Ph.D., *Adjunct/Pharmacology*
Neal Swerdlow, M.D.,Ph.D., *Psychiatry*
Palmer W. Taylor, Ph.D., *Pharmacology*
Robert D. Terry, M.D., *Emeritus/Neurosciences and Pathology*
Doris A. Trauner, M.D., *Neurosciences and Pediatrics*
Roger Tsien, Ph.D., *Pharmacology, Chemistry and Biochemistry*
Eric Turner, M.D.,Ph.D., *In-Residence/Psychiatry*
Mark Tuszynski, M.D.,Ph.D., *Neurosciences*
Wylie Vale, Ph.D., *Adjunct/Biology and Medicine*
Ajit Varki, M.D., *Medicine*
Mark C. Whitehead, Ph.D., *Surgery*
David Williams, Ph.D., *Adjunct/Pharmacology and Neurosciences*
Anthony Wynshaw-Boris, M.D.,Ph.D., *Pediatrics and Medicine*
Tony Yaksh, Ph.D., *Anesthesiology and Pharmacology*
Justin Zivin, M.D.,Ph.D., *Neurosciences*

Charles Zuker, Ph.D., *Biology-Neurobiology Section and Neurosciences*

ASSOCIATE PROFESSORS

Armin Blesch, Ph.D., *Adjunct/Neurosciences*
Wendy Campana, Ph.D., *Anesthesiology*
Andrea Chiba, Ph.D., *Cognitive Science*
E.J. Chichilnicky, Ph.D., *Adjunct/Neurosciences*
Sascha du Lac, Ph.D., *Adjunct/Neurosciences*
Laura L. Dugan, M.D., Ph.D., *Medicine*
David Feifel, M.D., Ph.D., *In-Residence/Psychiatry*
Joseph G. Gleeson, M.D., *Neurosciences*
Donna Gruol, Ph.D., *Adjunct/Neurosciences*
Bruce A. Hamilton, Ph.D., *Medicine*
Jeffry S. Isaacson, Ph.D., *Neurosciences*
Richard Krauzlis, Ph.D., *Adjunct/Neurosciences*
Jaime Pineda, Ph.D., *Cognitive Science*
William R. Schafer, Ph.D., *Adjunct/Biological Sciences and Neurobiology*
Katerina Semendeferi, Ph.D., *Anthropology*
Paul A. Slesinger, Ph.D., *Adjunct/Neurosciences*
Evelyn Tecoma, M.D.,Ph.D., *Clinical Neurosciences*
John Thomas, Ph.D., *Adjunct/Neurosciences and Biology*
Yimin Zou, Ph.D., *Biology*

ASSISTANT PROFESSORS

Stephan Anagnostaras, Ph.D., *Psychology*
Adam Aron, Ph.D., *Psychology*
James B. Brewer, M.D., Ph.D., *Radiology and Neurosciences*
Virginia de Sa, Ph.D., *Cognitive Science*
Timothy Gentner, Ph.D., *Psychology*
S.V. Penelope Jones, Ph.D., *Psychiatry*
Jonathan Lin, Ph.D., *Pathology*
Jill Leutgeb Ph.D., *Biology*
Stefan Leutgeb, Ph.D., *Biology*
Mark Mayford, Ph.D., *Adjunct/Neurosciences*
Terunaga Nakagawa, M.D., Ph.D., *Chemistry and Biochemistry*
Sharon Nichols, Ph.D., *Adjunct/Neurosciences*
Ardem Patapoutian, Ph.D., *Cell Biology*
Gentry N. Patrick, Ph.D., *Biological Sciences*
Pam Reinagel, Ph.D., *Biology*
John Reynolds, Ph.D., *Adjunct/Neurosciences*
Subhojit Roy, Ph.D., *Neurosciences*
John Serences, Ph.D., *Psychology*
Tatyana Sharpee, Ph.D., *Adjunct/Physics*
Gabriel A. Silva, Ph.D., *Bioengineering*
Lisa Stefanacci, Ph.D., *Adjunct/Psychiatry*
Lisa Stowers, Ph.D., *Adjunct/Neurosciences*
Michael A. Taffe, Ph.D., *Neuropharmacology*
Jing Wang, Ph.D., *Biological Sciences*
Angela Yu, Ph.D., *Cognitive Sciences*
Binhai Zheng, Ph.D., *Neurosciences*
Eric Zorilla, Ph.D., *Adjunct/Neurosciences*

OFFICE: Building #1, School of Medicine, Mail Code 0662
http://neurograd.ucsd.edu

THE GRADUATE PROGRAM

The Neurosciences Graduate Program accepts candidates for the Ph.D. degree who have undergraduate majors in such disciplines as biology, chemistry, engineering, microbiology, mathematics, physics, psychology, and zoology. A desire

and competence to understand how the nervous system functions is more important than previous background and training.

DOCTORAL DEGREE PROGRAM

Students in this program receive guidance and instruction from a campuswide group of faculty interested in nervous system mechanisms. Each student, in consultation with an advisory committee, selects courses relevant to his or her research interests and goals. The selection will include formal courses listed in this catalog and informal seminars offered by the department. A regular schedule of rotation through the laboratories of faculty members is a feature of the first year; the student is exposed in this way to the various approaches, techniques, and disciplines represented on the campus.

SPECIALIZATION IN COMPUTATIONAL NEUROSCIENCE

The Neuroscience Graduate program offers a specialization in Computational Neuroscience. Students in the Computational Neuroscience specialization are trained in the broad range of scientific and technical skills essential to understand the computational resources of neural systems. Students in this specialization will be required to fulfill all of the academic requirements of students in the Neurosciences Graduate Program. In addition to these requirements, students in the Computational Neuroscience specialization must successfully complete a set of three core computational courses, an advanced laboratory, and computational neuroscience journal clubs.

Required courses include:

Core Courses:

Neurosci. 200A-B-C
Neurosci. 225
Neurosci. 241
Neurosci. 257
Neurosci. 276

Computational Neurocience Specialization Courses:

BGGN 246A-B
BGGN 260
BGGN 266
Cog. Sci. 260
Physics 271

COURSE WORK

By the time of the minor proposition (see below), students are expected to demonstrate competence in the basics of neuroscience by taking five quarters of mandatory course work—three quarters of Basic Neuroscience (Neurosci. 200 A-B-C), and one quarter each of Neuroanatomy Lab (Neurosci. 257) and Statistical Methods and Experimental Design (Neurosci. 225). In addition, students choose among various core elective courses, such as Molecular and Cellular Neuroendocrinology (Neurosci. 222), Neuropsychopharmacology (Neurosci. 277), Molecular and Cellular Neurobiology (Neurosci. 268), Developmental Neuroscience (Neurosci. 263) and approved courses from other graduate departments. Students are also permitted to substitute previous courses that are similar to the Neurosciences core courses. Such a substitution would require approval of the chair of the Curriculum Committee or the director of the Graduate Program.

MINOR PROPOSITION

The purpose of this examination is to test the student's ability to choose a problem in the neurosciences and propose an experimental approach to its solution. The problem should be broad, requiring experimental approaches from more than one discipline. The problem should be outside the area of the student's anticipated dissertation research. Students will be required to demonstrate a working knowledge of the disciplines involved in the minor proposition.

Oral defense of the minor proposition will be required at the end of the winter quarter of the second year of study.

DISSERTATION

During the second year, students are expected to propose and initiate work on a dissertation problem under the guidance of a faculty preceptor. The neurosciences group at UCSD currently conducts animal research and clinical studies in the fields of neuroanatomy, neurochemistry, neuropharmacology, neurophysiology, comparative neurology, physiology of excitable membranes, synaptic transmission, neuronal integration and coding, nervous system tissue culture, neuroimmunology, brain function, sensory physiology, motor mechanism, and systems analysis as applied to neurological problems.

QUALIFYING EXAMINATION

This examination, a university requirement, focuses on the proposed research that the student will undertake for his or her dissertation. This examination is conducted by the approved doctoral committee.

DISSERTATION EXAMINATION

The required formalities listed in the Instruction for Preparation and Submission of Doctoral Dissertations issued by the Office of Graduate Studies and Research to students should be followed closely. The final examination includes both a public presentation followed by a closed defense of the dissertation with members of the Committee.

TEACHING

All students are required to perform as a teaching assistant for at least one quarter during their graduate career. To this end, opportunities to lecture and assist in laboratory exercises and demonstrations are available through a number of departments, including neurosciences, biology, and cognitive science.

PH.D. TIME LIMIT POLICIES

Students must advance to candidacy by the end of four years. Total university support cannot exceed six years. Total registered time at UCSD cannot exceed seven years.

COURSES

For course descriptions not found in the UC San Diego General Catalog, 2010–11, please contact the department for more information.

UNDERGRADUATE

199. Independent Research (2 or 4)
Laboratory research under the supervision of individual members of the faculty of the neurosciences department in one or a combination of neurosciences disciplines, e.g., neuroanatomy, neurophysiology, neurochemistry, neuropharmacology. (P/NP grades only.) (F,W,S)

GRADUATE

200A-B-C. Basic Neuroscience (4-4-4)
These courses are designed for graduate students in the neurosciences and other departments that are part of the interdisciplinary program (i.e., Biology, Cog. Sci.). These courses have been designed to cover as much basic neuroscience as possible in three quarters of study. It will combine two three-hour meetings each week with a 1.5 hour lecture and a 1.5 hour discussion of papers. These will be required courses for all first-year neurosciences graduate students. Biology will cross-list courses under Biology headings, making it a requirement of first year Biology graduate students. **Prerequisite:** graduate student or consent of instructor. (F,W,S)

210. Neurology Boot Camp (4)
For incoming doctoral students in Neurobiology, Computational Neurobiology, and Neurosciences. During the first two weeks in September, students commit to 10–15 hours per day in lectures and laboratories in electrophysiology, cellular anatomy, molecular biology, optical imaging, and computational neurobiology. Students also attend weekly seminars during fall quarter. **Prerequisites:** graduate standing only. For students in the following major codes: BI77, BI79, NE75.

221. Advanced Topics in Neurosciences (2)
Specialized advanced topic areas in neurosciences will be addressed in an interactive seminar course format. A different specific topic will be considered each quarter as announced in advance. Students will each present an aspect of the topic area and participate in discussions. **Prerequisite:** graduate student or consent of instructor. (F,W,S)

222. Molecular and Cellular Neuroendocrinology (4)
This course will examine the role of the CNS in controlling reproductive functions, stress, growth and behavior, with emphasis on the cellular and molecular mechanisms of neuroendocrine function. The lectures will be given by experts on each of the topic subjects. Lectures will include a basic introduction on the topic followed by a description of the current research in the area.

225. Statistical Methods and Experimental Design (2)
This is a practical course designed to emphasize the relationships between experimental design, statistical methods, and biomedical research. The assumptions behind the statistical tests, their appropriate use, and examples of misuse will be discussed. **Prerequisites:** registered student in SOM graduate program or approval of instructor.

232. Topics in Neurosciences at the Boundaries of Neurology and Psychiatry (4)
This course focuses on disorders affecting the nervous system, emphasizing phenomenological and mechanistic links and common biological themes across these disorders. Clinical presentations, pathology, and basic science of selected diseases will be covered in lecture and discussion format. **Prerequisite:** enrollment in UCSD graduate sciences or clinical fellowship program.

241. Ethics and Survival Skills in Academia (3)
This course will cover "ethical" issues in academia, including dishonesty, plagiarism, attribution, sexual misconduct, etc. We will also discuss "survival" issues, including job hunting, grant preparation, journal reviews, writing letters of recommendation, mentoring, etc. (W)

243. Physiological Basis of Human Information (2)
Psychological processes including attention, perception, and memory will be studied in connection with event-related potentials of the human brain. The interrelations among psychological and physiological events will be explored in order to arrive at unified concepts of human

information processing. **Prerequisites:** Neurosci. 238 or Psych. 231, and consent of instructor. (S/U grades only.) (F)

259. Workshop in Electron Microscopy (4)
This course is to introduce graduate students in the neurosciences to research methods used in electron microscopy (EM) through one hour of formal lecture, one hour of seminar, three hours of demonstration, and three hours of supervised laboratory work per week. Students will become familiar with sectioning EM, scanning EM, and freeze-fracture EM. **Prerequisites:** graduate-student standing in neurosciences doctoral program and consent of instructor. Enrollment limited. (S/U grades only.) (S)

263. Developmental Neuroscience (3)
A graduate reading course that highlights selected topics in the molecular study of neural development.

266. Development of Neural Circuits (4)
Course focuses on developmental processes during formation of neural circuits. Molecular, genetic, cellular mechanisms controlling neurogenesis, neuronal differentiation, positioning (migration), axon/dendrite patterning, and synapse formation will be discussed. Role of neural activity shaping circuit formation will be explored. **Prerequisites:** graduate standing only. For students in the following major codes: NE75, BI77, BI79, or consent of instructor.

268. Molecular and Cellular Neurobiology (4)
Molecular and cellular approaches to the study of the nervous system are advancing neurobiology at an increasingly rapid pace. This graduate-level course will address the latest molecular advances in the areas of: 1) synapse formation, neurotransmitter release, and neurotransmitter receptors; 2) nerve growth factors, their receptors, and neuronal apoptosis; 3) transcriptional regulation in the brain and peripheral nervous system; 4) cell culture, transgenic, and knock-out mouse model systems; 5) the molecular bases of genetic, psychiatric, and degenerative diseases of the nervous system; and 6) the current molecular knowledge of vision, sensory transduction, circadian rhythms, learning, memory, and behavior.

276. Neuroscience Research Rounds (1)
Neurosciences group faculty members and graduate students will present and discuss ongoing research. Attendance will be mandatory for first- and second-year graduate students. Faculty, advanced graduate students, medical students, postdoctoral trainees, and other interested parties are encouraged to attend. (F,W,S)

277. Neuropsychopharmacology (4)
An examination of the molecular and biochemical bases of drug and transmitter action. The course is devoted to receptor mechanisms, neuropharmacology, and drug action on excitable tissues. **Prerequisite:** graduate standing. (S)

285. Clinical Trails: Issues and
Dilemmas in Clinical Trials (3)
This course provides a methodological perspective on clinical trials. Topics will include ethics, design of Phase I–IV trials, randomization/blinding, bias, and sample-size power. Lectures will also cover "application" with eminent UCSD trialists describing conduct, design, and statistical issues of specific studies. **Prerequisites:** medical or graduate student standing.

296. Neurosciences Research Rotation (1-12)
Independent study. (S/U grades only.) (F,W,S)

298. Neurosciences Independent
Study Project (ISP) (1-12)
Prerequisite: approved ISP proposal. (F,W,S)

299. Neurosciences Research (1-12)
Independent study. (S/U grades only.) (F,W,S)

401. Neurology General Clinical
Selective Clerkship (7)
Provides opportunities for practical application of neurological skills to the understanding and treatment of a variety of clinical disorders of the nervous system. **Prerequisite:** successful completion of first two years of medical school. (F,W,S)

426. Subintern Pediatric Neurology (7)
Subinterns are responsible for the primary care of hospitilized pediatric neurology patients under direct resident and attending physician supervision. Students will perform procedures such as lumbar puncture and participate in night call, daily teaching round, neurology Grand Rounds, and Journal Clubs. **Prerequisite:** Neurology 401 or consent of instructor. (F,W,S)

427. Neurology Outpatient (7)
The student will rotate through the general and subspecialty (stroke, epilepsy, headache, nerve, and muscle) neurology clinics based at UCSD Medical Center, Perlman, VAMC, and Children's Hospital. There are lectures and clinical conferences. **Prerequisite:** Neurosciences 401 or equivalent. (F,W,S)

496. Clinical Independent Study (1-21)
Independent clinical study for medical students (S/U grades only.) (F,W,S)

500. Apprenticeship Teaching (1-4)
Participation in the department teaching program is required of all students working toward a Ph.D. degree. In general, students are not expected to teach in the first year, but are required to serve as teaching assistants or tutors for one quarter at any time during their subsequent years of training. The amount of teaching required is equivalent to the duties expected of a 50 percent assistant for one quarter. **Prerequisite:** neurosciences graduate students. (S/U grades only.) (F,W,S)

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