



Interdepartmental PhD Program in Neuroscience

Rosalind Franklin University of Medicine & Science
The Chicago Medical School



Mission Statement

The objective of the program is to prepare Ph.D. and M.D./Ph.D. students for careers in research and teaching. The course of study will be guided by the integration of molecular, cellular, systems, behavioral, and clinical approaches to understanding brain function.

The University and the School

The graduate school of the University was established as an expansion of The Chicago Medical School, which was founded in 1912. In 2004, the name "Rosalind Franklin University of Medicine and Science" was adopted in honor of this important pioneer of DNA research. In 2007, the Interdisciplinary Graduate Program in Biomedical Sciences (IGPBS) was established, which oversees the application process and first-year curriculum for all PhD students in the School of Graduate and Postdoctoral Studies, including Neuroscience students.

The campus is located close to Lake Michigan in the beautiful North Shore region of Chicago. It has expanded dramatically in the past three years, including the addition of a new research building, a student facilities and classroom building, and three student apartment buildings. While the immediate locale is suburban, it provides easy access to many cultural and scientific resources in Chicago and to various recreational opportunities in Illinois and Wisconsin.

Student Outcomes

Thirty-two students have now matriculated from the Interdepartmental Neuroscience Graduate Program and its predecessor program. Many have moved on to postdoctoral fellowships or residencies at top universities including Baylor, Duke, Northwestern, Stanford, and Yale.

Neuroscience students have been notably successful at generating their own funding, as individual National Research Service Awards (NRSAs) from the NIH. This success attests to a small but high quality program in which every effort is made to maximize the potential of each graduate student. Eleven students are enrolled as of the 2011-12 academic year.





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Program of Study

Students enter the Neuroscience program through the IGPBS, which oversees the core graduate courses and laboratory rotations during the first year of study. They then join the Neuroscience track at the end of their first year. The second year is spent in advanced course work and laboratory research aimed at obtaining preliminary data for the Qualifying Exam, which is required to advance to Ph.D. candidacy. Subsequent years are spent on dissertation research. Students receive guidance throughout the program from both the IGPBS Advisory Committee and their tailored Dissertation Advisory Committee.

Areas of Research Strength

- Drug addiction and drug-induced neuroplasticity
- Alzheimer's and Parkinson's diseases
- Stem cell & gene therapy strategies for CNS repair
- Neurobiology of learning and behavior
- Basal ganglia anatomy, physiology & pharmacology
- Neurodegeneration
- Growth factors and their receptors
- Regulation of neuronal gene expression
- Ion channels, ion transport & membrane biophysics
- Molecular biology of neuropeptides & their receptors
- Neuroendocrinology
- Neuropharmacology
- Neuroproteomics
- Neurophysiology

Research Facilities

Core and major facilities include: Confocal Microscopy Facility equipped for computer-assisted stereology; laser microdissection facility with quantitative real-time RT-PCR system; two-photon imaging; live-cell imaging facility; electron microscopy facility; x-ray crystallography facility for determination of the complete three-dimensional structure of proteins, RNA, and DNA; Midwest Proteome Center-MALDI and electrospray MS/MS mass spectrometry; protein separation and bioinformatics facilities.

Participating Departments

- Biochemistry and Molecular Biology
- Cell Biology and Anatomy
- Cellular and Molecular Pharmacology
- Neuroscience
- Physiology and Biophysics



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Participating Faculty

Students can choose a dissertation advisor from a diverse group of active research scientists who share a tradition of extramural support, primarily from the NIH. More information on each faculty member can be found on departmental web pages:

<http://rosalindfranklin.edu/dnn/chicagomedicalschool/home/CMS/tabid/821/Default.aspx#>

Marjorie A. Ariano, Professor of Neuroscience; Ph.D., UCLA, 1977; *Molecular, cellular and behavioral studies of dopamine depletion in early stages of Parkinson's disease.*

Dmitri Y. Boudko, Assistant Professor of Physiology and Biophysics, Ph.D., Belarusian Academy of Sciences, 1994; *Molecular physiology and the evolution of essential amino acid transport.*

Christopher Brandon, Associate Professor of Cell Biology and Anatomy; Ph.D., Yeshiva (Einstein) University, 1974; *Mechanisms of neural computation in the visual systems of vertebrates and invertebrates.*

Lisa Ebihara, Associate Professor of Physiology and Biophysics; M.D./Ph.D., Duke University, 1981; *Structure and function of gap junctional proteins.*

Lise Eliot, Associate Professor of Neuroscience; Ph.D., Columbia University, 1991; *Plasticity and sex differences in brain and cognitive development.*

William N. Frost, Professor and Chair of Cell Biology and Anatomy; Ph.D., Columbia University, 1987; *Neural mechanisms of decision-making, pattern generation, prepulse inhibition, and learning in two invertebrate model systems: the marine mollusks Aplysia and Tritonia.*

Marc Glucksman, Professor of Biochemistry and Molecular Biology; Ph.D., Columbia University, 1990; *Structural neurobiology of processing enzymes involved in neurodegenerative/neuropsychiatric disorders and reproduction; proteomics of the brain.*

Michelle Hastings, Assistant Professor of Cell Biology and Anatomy; Ph.D., Marquette University, 1998; *RNA processing in neurodegenerative diseases.*

Richard A. Hawkins, Professor of Physiology and Biophysics; Ph.D., Harvard University, 1969; *Cerebral energy metabolism; cerebral nutrition and transport characteristics of the blood-brain barrier; metabolic encephalopathies; regional cerebral function.*

Donghee Kim, Professor of Physiology and Biophysics; Ph.D., Michigan State, 1982; *Molecular physiology of two-pore domain K⁺ channels and transient receptor potential A1 channel.*

Hongkyun Kim, Assistant Professor of Cell Biology and Anatomy; Ph.D., SUNY at Buffalo, 1999; *Neurogenetics in C. elegans.*

Michela Marinelli, Associate Professor of Cellular and Molecular Pharmacology, Ph.D., Bordeaux II, 1997. *Neurophysiological mechanisms of addiction.*

Robert Marr, Assistant Professor of Neuroscience; Ph.D., McMaster University, 1999; *Gene therapy approaches to the treatment of Alzheimer's disease.*



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Gloria E. Meredith, Professor and Chair of Cellular and Molecular Pharmacology; Ph.D., Georgetown University, 1983; *Neuronal plasticity, cell death and inflammation in Parkinson's disease; role of neurotrophins in addiction.*

Aron D. Mosnaim, Professor of Cellular and Molecular Pharmacology; Ph.D., University of Strathclyde (Scotland), 1969; *Metabolism and neuroimmunopharmacology studies of endogenous peptides involved in pain mechanisms.*

Kenneth E. Neet, Professor of Biochemistry and Molecular Biology and Associate Dean for Research; Ph.D., University of Florida, 1965; *Growth factors and their receptors; signal transduction; apoptosis; neurobiology; protein structure-function.*

Monica Oblinger, Professor of Cell Biology and Anatomy; Ph.D., Purdue University, 1981; *Molecular mechanisms involved in the recovery from neuronal injury; cytoskeletal genes in axonal regeneration; gonadal steroids and neuroprotection.*

Daniel A. Peterson, Associate Professor of Neuroscience, Ph.D.; Otago (New Zealand), 1991; *Neuronal cell death mechanisms and therapeutic gene delivery; neurogenesis in the adult mammalian CNS.*

Darryl R. Peterson, Professor of Physiology and Biophysics; Ph.D., University of Illinois, 1973; *Blood-brain barrier, regulation of brain extracellular fluid, pathophysiology of stroke, drug delivery to the brain.*

Judith A. Potashkin, Associate Professor of Cellular and Molecular Pharmacology; Ph.D., SUNY at Buffalo, 1985; *Changes in gene expression and the regulation of pre-mRNA splicing that occur with drug addiction and Parkinson's disease.*

Hector Rasgado-Flores, Associate Professor of Physiology and Biophysics; Ph.D., Center for Research and Advanced Studies; CINVESTAV (Mexico), 1984; *Volume regulatory mechanisms and transport of calcium and magnesium in muscle and nerve cells.*

J. Amiel Rosenkranz, Assistant Professor of Cellular and Molecular Pharmacology; Ph.D. University of Pittsburgh, 2002; *Amygdala physiology in learning and emotion.*

Henry Sackin, Professor of Physiology and Biophysics; Ph.D., Yale University, 1978; *Electrolyte transport; mechanotransduction; volume regulation; cloned K channels; structure-function of ion channels.*

Ann Snyder, Research Associate Professor of Cellular and Molecular Pharmacology; Ph.D., University of Illinois, 1971; *Glial and neuronal glucose transport and metabolism and neurotoxic effects of alcohol.*

Heinz Steiner, Associate Professor of Cellular and Molecular Pharmacology; Ph.D., Duesseldorf (Germany), 1989; *Dopamine and opioid regulation of basal ganglia circuits; molecular mechanisms of psychostimulant addiction.*

Grace E. Stutzmann, Assistant Professor of Neuroscience; Ph.D. New York University, 1999; *Neuronal calcium signaling and mechanisms of calcium dysregulation in disease states, particularly Alzheimer's disease.*



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Kuei-Yuan Tseng, Assistant Professor of Cellular and Molecular Pharmacology; M.D., Ph.D., University of Buenos Aires, Argentina, 2002. *Prefrontal cortex plasticity and its modulation by monoamines.*

Janice H. Urban, Associate Professor of Physiology and Biophysics; Ph.D., Loyola University of Chicago, 1987; *Molecular and physiological aspects of hypothalamic neuroendocrine function; stress and reproductive hormones.*

D. Eric Walters, Professor of Biochemistry and Molecular Biology; Ph.D., University of Kansas, 1978; *Computer-aided drug design; modeling membrane proteins; chemosensory transduction mechanisms.*

Anthony R. West, Associate Professor of Neuroscience; Ph.D., Wayne State University, 1997; *Role of nitric oxide and dopamine interactions in Parkinson's disease and schizophrenia; electrophysiological and neurochemical studies of striatal neuron activity.*

Marina E. Wolf, Professor and Chair of Neuroscience, Ph.D., Yale University, 1986; *Role of neuronal plasticity in drug addiction; interactions between dopamine and glutamate receptors.*

Curriculum

Core Curriculum

First-year course work begins with an intensive introduction to molecular and cell biology, emphasizing original research articles and the principles of modern experimental techniques. In mid-winter, the focus shifts to several high-impact diseases, such as cancer, HIV-AIDs, and Parkinson's disease, as a way of introducing "systems" biology and translational research. In the spring, students interested in the Neuroscience track enroll in graduate-level Neuroscience and Physiology courses. Other core courses to be completed in the first year include Biostatistics, Research Ethics, and The Art of Scientific Presentation.

Students officially enter the Neuroscience program in the second year, when they join the laboratory of one of the participating faculty members. Second-year courses include Neurophysiology, Neuropharmacology, Neuronal Signaling, and Neurodegeneration, along with two optional short courses on Confocal Microscopy and Human Brain Dissection. Students are also free to enroll in elective courses offered by other departments (see the list below). However, most of a student's time during the second year is dedicated to learning laboratory techniques and obtaining preliminary data to be used in the Qualifying Exam and dissertation proposals.

Laboratory Experience

Students are expected to complete 3-4 rotations in different laboratories during the first year, to familiarize themselves with a variety of research topics, approaches, techniques, and mentors. Laboratory rotations are every bit as important as course work, since "hands-on learning" is the most essential component of training as a research scientist. At the end of each rotation, students will give a brief presentation about their experience, which provides valuable speaking practice and helps inform faculty about their ongoing progress.



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Teaching Experience

Part of our goal is to prepare students to compete for academic positions. To that end, we offer opportunities to become involved in teaching programs. All students are required to serve as a Teaching Assistant in the Medical Neuroscience course. In addition, students have the opportunity to serve as Teaching Assistants in many other courses offered by participating departments.

Seminars and Journal Club

Students are required to attend the Interdepartmental Neuroscience Seminar Series. Seminars take place once a month and have featured internationally recognized scientists in diverse fields. After the seminar, graduate students meet for lunch with the speakers, allowing for informal interactions. Students are also expected to participate in a Journal Club from any of the participating departments during each term they are enrolled in the program.

Electives

Students may electively enroll in a wide variety of courses offered by other departments, such as:

MBCH505 Biochemical Pathways
MBCH508 Human Genetics
GBCH543 Enzyme Structure and Mechanism
GBCH544 Physical Biochemistry
MCBA500 Clinical Anatomy
MCBA504 Embryology
MCBA615 Basic Neurology-Advanced Neuroanatomy
GCMP513 Principles of Drug Action & Therapeutics
GMIC510 Introductory Immunology
GMIC520 Molecular Parasitology
GMIC 542 Selected Topics of Microbiology, Virology, Parasitology, Immunology, & Molecular Biology
GMIC549 Flow Cytometric Techniques
GMIC564 Contemporary Topics in Clinical Immunology

GMIC605 Molecular Biology Techniques
GMIC606 Cancer Biology and Signaling
GNSC505 Confocal Microscopy and Design-Based Stereology
GPHY512 Physiology of the Autonomic Nervous System
GPSC530 Introduction to Neuropsychology
GPSC540 Learning Theory
GPSC700 Psychology of Aging
GPSC751 Health Psychology and Behavioral Medicine
GPSC765 Clinical Psychopharmacology
GPSC782 Neuropsychology of Emotion
MTD702 Advanced Topics in Cell Biology: Intracellular Trafficking
MTD703 Advanced Topics in Cell Biology: Extracellular Matrix and Cytoskeleton

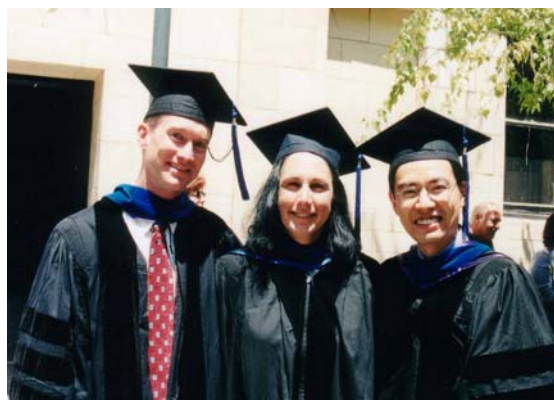


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Qualifying Examination

This exam is to be completed at the beginning of the third year. Students write an NIH-style grant proposal, covering the work they intend to carry out in their dissertation research, based in part on their preliminary data from the preceding year. They then present their proposal in an open seminar, followed by a closed defense with a five-member committee of faculty members. This exercise provides important practice in "real-life" skills including hypothesis development, critical thinking, grant writing, and public speaking.



Application Process and Entrance Requirements

Formal entrance into the Interdepartmental Neuroscience Program occurs at the end of the first year of studies. Before that, students apply and are admitted to the Interdisciplinary Graduate Program in Biomedical Sciences (IGPBS) which oversees the core curriculum for all first year PhD students in the basic sciences at Rosalind Franklin University. Application materials can be found at:

<http://rosalindfranklin.edu/dnn/administration/facultystaff/currentstudents/admissions/sgps.aspx>

Entrance requirements include a baccalaureate degree from an accredited college or university, satisfactory scores on the Graduate Record Examination (GRE), and three letters of recommendation. Most successful applicants have prior research experience and completed undergraduate courses in Biochemistry and Statistics. Applications should be completed by January 13, 2012. Qualified applicants will be invited to visit on Friday, March 2, 2012 for Recruitment Day.

Financial Support

Students admitted to the program receive a full tuition waiver, a \$26,000 annual stipend and are eligible to participate in the employee health care benefit program at competitive rates.

Correspondence and Information:

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