

## NEUROSCIENCE

### OVERVIEW

The Neuroscience Graduate Program is a university-wide, multidisciplinary, Ph.D. granting program that has more than 50 faculty mentors across 13 departments and 5 colleges. This program emphasizes rigorous training in neuroscience-related research, educates students about human health, and encourages interdisciplinary research projects.

### DEGREES

- Neuroscience M.S.
- Neuroscience Ph.D.

### FACULTY

**Althoff, Robert;** Associate Professor, Department of Psychiatry; MD, University of Illinois

**Applebee, Angela;** Associate Professor, Department of Neurological Sciences; MD, University of South Dakota School of Medicine, Vermillion

**Ballif, Bryan A.;** Associate Professor, Department of Biology; PHD, Harvard University

**Berger, Christopher Lewis;** Associate Professor, Department of Molecular Physiology and Biophysics; PHD, University of Minnesota Twin Cities

**Bongard, Joshua C.;** Associate Professor, Department of Computer Science; PHD, University of Zurich

**Bouton, Mark Earhart;** Professor, Department of Psychology; PHD, University of Washington

**Brayden, Joseph Elliott;** Professor, Department of Pharmacology; PHD, University of Vermont

**Brewer, Matthias;** Associate Professor, Department of Chemistry; PHD, University of Wisconsin Madison

**Cannizzaro, Michael S.;** Associate Professor, Department of Communication Sciences; PHD, University of Connecticut

**Cipolla, Marilyn Jo;** Professor, Department of Neurological Sciences; PHD, University of Vermont

**Cornbrooks, Carson Justis;** Associate Professor, Department of Neurological Sciences; PHD, Virginia Commonwealth University

**Dostmann, Wolfgang R. G.;** Professor, Department of Pharmacology; MD, University of Munich

**Dumas, Julie Anna;** Associate Professor, Department of Psychiatry; PHD, University of North Carolina

**Ebert, Alicia;** Assistant Professor, Department of Biology; PHD, Colorado State University

**Eppstein, Maggie;** Associate Professor, Department of Computer Science; PHD, University of Vermont

**Erdos, Benedek;** Assistant Professor, Department of Pharmacology; PHD, Semmelweis University

**Falls, William A.;** Professor, Department of Psychology; PHD, Yale University

**Flynn, Sean;** Assistant Professor, Department of Neurological Sciences; PHD, University of Utah

**Forehand, Cynthia Jean;** Professor, Department of Neurological Sciences; PHD, University of North Carolina Chapel Hill

**Francklyn, Christopher Steward;** Professor, Department of Biochemistry; PHD, University of California Santa Barbara

**Freeman, Kalev;** Assistant Professor, Department of Surgery; MD, University of Colorado Boulder

**Garavan, Hugh P.;** Associate Professor, Department of Psychiatry; PHD, Bowling Green State University

**Green, John Thomas;** Associate Professor, Department of Psychology; PHD, Temple University

**Hammack, Sayamwong E.;** Associate Professor, Department of Psychology; PHD, University of Colorado

**Henry, Sharon Margaret;** Professor, Department of Rehabilitation and Movement Science; PHD, University of Vermont (Emeritus)

**Holmes, Gregory;** Professor, Department of Neurological Sciences; MD, University of Virginia

**Howe, Alan K.;** Associate Professor, Department of Pharmacology; PHD, Northwestern University

**Hudziak, James Joseph;** Professor, Department of Psychiatry; MD, University of Minnesota Twin Cities

**Jaworski, Diane Marie;** Professor, Department of Neurological Sciences; PHD, Texas Woman's University

**Langevin, Helene M.;** Professor, Department of Neurological Sciences; MD, McGill University

**Lenck-Santini, Pierre-Pascal;** Assistant Professor, Department of Neurological Sciences; PHD, Universite de Provence

**Li, Dawei;** Assistant Professor, Department of Microbiology and Molecular Genetics; PHD, Shanghai Jiao Tong University

**Lounsbury, Karen M.;** Professor, Department of Pharmacology; PHD, University of Pennsylvania

**Mawe, Gary Michael;** Professor, Department of Neurological Sciences; PHD, Ohio State University

**May, Victor;** Professor, Department of Neurological Sciences; PHD, Northwestern University

**McCarthy, Sarah A.;** Assistant Professor, Department of Neurological Sciences; PHD, Pennsylvania State University, College of Medicine

**Morielli, Anthony D.;** Associate Professor, Department of Pharmacology; PHD, University of California Berkeley

**Naylor, Magdalena Raczowska;** Professor, Department of Psychiatry; MD/PHD, Warsaw Medical Academy

**Nelson, Mark;** Professor and Chair, Department of Pharmacology; PHD, Washington University in St Louis

**Parsons, Rodney Lawrence;** Professor, Department of Neurological Sciences; PHD, Stanford University

**Potter, Alexandra S.;** Assistant Professor, Department of Psychiatry; PHD, University of Vermont

**Prelock, Patricia;** Professor, Department of Pediatrics; PHD, University of Pittsburgh

**Schermerhorn, Alice C.;** Assistant Professor, Department of Psychology; PHD, University of Notre Dame

**Scott, Rodney;** Professor, Department of Neurological Sciences; MD/PHD, University of Zimbabwe

**Sibold, Jeremy S.;** Assistant Professor, Department of Rehabilitation and Movement Science; EDD, West Virginia University

**Spees, Jeffrey;** Associate Professor, Department of Medicine-Cardiovascular; PHD, University of California Davis

**Teuscher, Cory;** Professor, Department of Medicine-Immunobiology; PHD, University of New Mexico

**Toufexis, Donna J.;** Assistant Professor, Department of Psychology; PHD, McGill University

**Van Houten, Judith;** Professor, Department of Biology; PHD, University of California Santa Barbara

**Vizzard, Margaret A.;** Professor, Department of Neurological Sciences; PHD, Thomas Jefferson University

**Wellman, George C.;** Professor, Department of Pharmacology; PHD, University of Vermont

**Weston, Matthew;** Assistant Professor, Department of Neurological Sciences; PHD, Baylor College of Medicine

### Graduate Medical Courses

#### **GRMD 353. Medical Fdns of Medicine. 3 Credits.**

Fundamental vocabulary, concepts, and methods of molecular genetics, cell physiology, biochemistry and metabolism including cell-cell and cell-environment communication, cell proliferation and cell death. Pre/co-requisite: Graduate standing; permission of the Instructor; six credits coursework, plus two credits lab in Biology, general chemistry, organic chemistry and Physics.

#### **GRMD 354. Medical Human Struc & Fncn. 4-8 Credits.**

Combination of gross anatomy, histology, embryology, physiology and medical imaging to present an integrated overview of the human body. Pre/co-requisites: Graduate standing; Instructor permission; six credits coursework, plus two credits lab in Biology, general chemistry, organic chemistry and Physics; graduate coursework in Cell Biology or Biochemistry.

#### **GRMD 355. Medical Attacks & Defenses. 4 Credits.**

Principles of hematology, immunology, microbiology, toxicology, pathology, pharmacology, and neoplasia as a foundation to pathophysiology and therapeutics. Pre/co-requisite: Graduate standing; Instructor permission; six credits coursework plus two credits lab in Biology, general chemistry, organic chemistry and Physics; graduate coursework in Cell Biology or Biochemistry and Anatomy & Physiology.

#### **GRMD 356. Medical Nutr, Metab, & GI Syst. 5 Credits.**

Organizes studies in nutrition, organ systems metabolism and the gastrointestinal and endocrine systems through integrated lessons in cell biology, biochemistry, normal and pathologic anatomy, pharmacology, physiology, pathophysiology and microbiology. Pre/co-requisite: Graduate standing; permission of the Instructor; six credits coursework, plus two credits lab in Biology, Anatomy & Physiology, and an introduction to immunology, microbiology, toxicology, pathology and pharmacology.

#### **GRMD 357. Medical Neural Science. 6 Credits.**

Organize study of the human nervous and behavioral system through lessons that integrate cell metabolism, endocrinology, normal and pathologic anatomy, pharmacology, physiology, pathophysiology and psychopathology. Pre/co-requisite: Graduate standing; permission of the Instructor; six credits coursework plus two credits lab in Biology, general chemistry, organic chemistry and Physics; Graduate coursework in Cell biology or Biochemistry, human anatomy & physiology, and an introduction to immunology, microbiology, toxicology, pathology and pharmacology.

#### **GRMD 358. Medical Connections. 1 Credit.**

Introduction to musculoskeletal and integumentary systems that integrates cell metabolism, endocrinology, normal and pathologic anatomy, physiology and pathophysiology, and pharmacology. Pre/co-requisite: Graduate standing; Instructor permission; six credits coursework plus two credits lab in biology, general chemistry, organic chemistry and physics; graduate coursework in cell biology or biochemistry, human anatomy and physiology, and an introduction to immunology, microbiology, toxicology, pathology, and pharmacology.

#### **GRMD 359. Medical Cardio, Resp, Renal Syst. 6 Credits.**

Organizes studies in the cardiovascular, respiratory and renal system through lessons that integrate cell metabolism, endocrinology, normal and pathologic anatomy, pharmacology, physiology and pathophysiology. Pre/co-requisite: graduate standing; permission of the Instructor; six credits coursework plus two credits lab in biology or biochemistry, human anatomy and physiology, and an introduction to immunology, microbiology, toxicology, pathology and pharmacology.

#### **GRMD 360. Medical Generations. 5 Credits.**

Organizes studies in reproduction, development and aging through lessons that integrate behavioral development, cell and molecular biology, endocrinology, normal and pathologic anatomy, pharmacology, physiology and pathophysiology. Pre/co-requisite: Graduate standing; permission of the Instructor; six credits coursework plus two credits lab in biology, general chemistry, organic chemistry and physics; graduate coursework in cell biology or biochemistry, human anatomy and physiology, and an introduction to immunology, microbiology, toxicology, pathology and pharmacology.

### Neuroscience Courses

#### **NSCI 225. Human Neuroanatomy. 0-3 Credits.**

Functional anatomy of the human nervous system and its cells. Focus on both peripheral and central nervous system. Lectures and laboratory (gross and microscopic anatomy). Prerequisite: Instructor permission.

#### **NSCI 302. Neuroscience. 4 Credits.**

Functional anatomy of the human nervous system. Lectures and laboratory providing learning experience with dissected specimens, gross and microscopic anatomy. Incorporates clinical information from physician-scientists. Prerequisite: Physical Therapy major or Instructor permission.

**NSCI 306. Techniques in Neurobiology. 3 Credits.**

Discussion of techniques used to study the nervous system. Experience with light, fluorescence, electron microscopy; microsurgical procedures; electrophysiological stimulating, recording techniques; neuronal tracing techniques. Prerequisite: Permission of the Instructor.

**NSCI 320. Developmental Neurobiology. 3 Credits.**

Provides fundamental knowledge of cell-to-cell interactions necessary for proper development and organization of the nervous system. Topics include pattern formation, neuronal differentiation, axon guidance, and target interactions. Prerequisite: Permission of the Instructor. Alternate years.

**NSCI 323. Neurochemistry. 3 Credits.**

Biochemistry of the nervous system. Topics include ion channels, synaptic function, neurotransmitters and neuropeptides, signal transduction, and hormones in brain function. Prerequisite: Permission of the Instructor.

**NSCI 326. Basic Sci-Neurologic Disease. 3 Credits.**

In-depth examination of basic mechanisms and clinical aspects of a related subset of neurological disorders, e.g. neurodegenerative disease or disorders of neurotransmission. Disease group changes every year. Prerequisite: Advanced Graduate Students, Neuroscience Faculty and Residents in Neurology, Neurosurgery and Psychology.

**NSCI 327. Resp Conduct in Biomed Rsch. 1 Credit.**

Topics in Scientific Integrity surrounding responsible conduct and practices in biomedical research. Prerequisites: Advanced Graduate students, postdoctoral fellows and assistant professors in the biological or biomedical sciences.

**NSCI 328. Techniques in Microscopy. 3 Credits.**

Topics shall include practical background in microscopy, including brightfield, epifluorescence, confocal, multi-photon, deconvolution, atomic force and electron microscopy. Prerequisite: Instructor permission.

**NSCI 329. Topics in Excitable Membranes. 2 Credits.**

This course is a graduate course designed to introduce the fundamentals of cellular electrophysiology through independent student reading and faculty-led group discussions of journal articles. Prerequisite: Instructor permission.

**NSCI 330. Comparative Neurobiology. 3 Credits.**

Examination of the cellular mechanisms that underlie selective motor and sensory abilities, and unique behaviors that have evolved in various species. Discussion and student presentations. Pre/co-requisite: Instructor permission.

**NSCI 381. Seminar in Neuroscience. 1 Credit.**

Research presentations and critical review of the literature in various areas of anatomical and neurobiological sciences.

**NSCI 382. Seminar in Neuroscience. 1 Credit.**

Research presentations and critical review of the literature in various areas of anatomical and neurobiological sciences.

**NSCI 391. Master's Thesis Research. 1-18 Credits.****NSCI 395. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles. Prerequisite: Instructor permission.

**NSCI 491. Doctoral Dissertation Research. 1-18 Credits.**