Neuroscience

Chair
- Daniel Tranel (Psychological and Brain Sciences/Neurology)

Graduate degree: Ph.D. in neuroscience
Faculty: http://neuroscience.grad.uiowa.edu/faculty
Web site: http://neuroscience.grad.uiowa.edu

The Neuroscience Program provides an interdisciplinary and interdepartmental approach to graduate education and research training in the structure, function, and development of the nervous system and its role in cognition and behavior. Students obtain training at all levels of the nervous system, from cellular/molecular to behavioral/cognitive.

Graduate Program of Study
- Doctor of Philosophy in neuroscience

Doctor of Philosophy
The Doctor of Philosophy program in neuroscience requires a minimum of 72 s.h. of graduate credit. The program’s curriculum is designed around three tracks: molecular/cellular, developmental/systems, and cognitive/behavioral. Following broad-based instruction in a core curriculum, students specialize in one of the tracks. Within a framework of core, track-specific, and elective courses, each student pursues a program of study individually designed according to his or her undergraduate training and graduate research goals. After enrolling in the Neuroscience Program, entering students consult with the advisory committee regarding their level of preparation for the program’s required courses.

The Student Advisory Committee meets with all first- and second-year graduate students once each semester, helping each student explore his or her research interests and select faculty mentors for the required laboratory rotations. Each student is expected to complete three rotations in faculty laboratories before selecting a thesis advisor. Rotations ordinarily last 12 weeks but may last from 8 to 16 weeks. Under special circumstances, two rotations may be in the same laboratory, an arrangement that permits the student to learn a variety of techniques and approaches before settling down to work on the dissertation project. Students usually choose a dissertation lab at the end of their first year.

BACKGROUND REQUIREMENTS
Students are expected to demonstrate competency, through prerequisites or course work, in each of four fields: biochemistry, general physiology, cell biology, and statistics. These requirements ordinarily should be fulfilled by the end of the first year of graduate study. Waivers of background course requirements may be requested by students who have taken equivalent courses before entering the Neuroscience Program.

NEUROSCIENCE CORE
The following courses form the core of the neuroscience graduate curriculum.
NSCI:4353 Neurophysiology 3-4 s.h.
NSCI:4753 Developmental Neurobiology 3 s.h.

Electives
Elective requirements may be met by completing 3 s.h. from a list of courses offered by the Departments of Anatomy and Cell Biology, Biology, Molecular Physiology and Biophysics, Pharmacology, Psychological and Brain Sciences, and other departments as appropriate. With permission of the Student Advisory Committee, students may satisfy the elective requirement wholly or in part by registration in NSCI:7301 Directed Study in Neuroscience.

Admission
Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations of the Graduate College.
For information about predoctoral training opportunities in neuroscience, contact the Neuroscience Program or visit its web site.

Financial Support
Full-time Neuroscience Program students receive stipends and full tuition scholarships through fellowships and research assistantships. Awards are renewed annually, based on continued satisfactory progress and availability of funds. The standard graduate student stipend for 2013-16 is $26,500.

The Neuroscience Program is committed to supporting its graduate students for their entire training period. Students normally are supported in the first year by the program. After that, support is expected to come from the student’s primary research mentor. Occasionally, advanced students are supported through teaching assistantships. Tuition is paid for all students.

NIH TRAINING GRANT
The Neuroscience Program is supported by a training grant from the National Institutes of Health. The grant provides stipend and tuition support for a select group of first- and second-year graduate students.

Facilities
Training is conducted primarily in the laboratories and teaching facilities of the Carver College of Medicine graduate Departments of Anatomy and Cell Biology, Biochemistry, Internal Medicine, Molecular Physiology and Biophysics, Neurology, Pharmacology, and Psychiatry; and the College of Liberal Arts and Sciences Departments
of Biology, Communication Sciences and Disorders, Health and Human Physiology, and Psychological and Brain Sciences. Students use faculty laboratories and central research facilities for ultrastructural analysis; histochemistry and immunocytochemistry; electrophysiology; fluorescence-activated cell sorting; cellular and subcellular biochemistry; cell, tissue, and organ culture; operant and classical conditioning; molecular biology; behavioral genetics; neural substrates of complex behavior; brain-behavior relationships in humans; neuropsychology; and functional neuroimaging (PET, fMRI).

Courses

**NSCI:4353 Neurophysiology** 3-4 s.h.
Physiological properties of nerve cells, nervous systems; axonal conduction, synaptic transmission, sensory transduction, integrative processes, higher functions. Prerequisites: (BIOL:2753 or BIOL:3253) and (MATH:1460 or MATH:1850) and (PHYS:1512 or PHYS:1612). Same as BIOL:4353.

**NSCI:4753 Developmental Neurobiology** 3 s.h.
Neural induction and nervous system patterning; neurogenesis, axon and dendrite outgrowth and targeting; synapse formation, specification, refinement; mechanisms of neuronal cell death; myelination; neural stem cells; introduction to cellular, molecular, and genetic techniques in studies of neural development. Prerequisites: BIOL:2753. Corequisites: BIOL:3253. Requirements: grade of B- or higher in BIOL:2753 or graduate standing. Same as BIOL:4753, MPB:4753.

**NSCI:5161 Undergraduate Research in Neuroscience** arr.
Experimental research under faculty supervision.

**NSCI:5210 Fundamentals of Behavioral Neuroscience** 4 s.h.
Concepts, methods, and findings in behavioral and cognitive neurosciences: emphasis on principles of neuroscience, sensation, motivation, emotion. Same as PSY:5210.

**NSCI:5212 Foundations in Behavioral and Cognitive Neuroscience** 4 s.h.
Concepts, methods, and findings in behavioral and cognitive neurosciences. Prerequisites: BIOL:3253 or PSY:5210 or NSCI:5210. Same as PSY:5212.

**NSCI:5365 Seminar: Neuropsychology and Neuroscience** arr.
Clinical neuropsychology and cognitive neuroscience: cutting-edge research from scientific journals, case presentations in clinical neuropsychology, and current research. Same as PSY:5365, NEUR:5365.

**NSCI:5653 Fundamental Neurobiology** 4 s.h.
Neurobiology from molecular/cellular to systems levels, including cell biology of neuron; membrane electrophysiology, synaptic transmission and plasticity, functional neuroanatomy, sensory systems from periphery to CNS, peripheral and central motor systems, autonomic systems emotion, memory, sleep, language, attention and cognition, development of nervous system; discussion of classic and recent journal articles. Same as BIOL:5653, PSY:5203.

**NSCI:6209 Steroid Receptor Signaling** 1 s.h.
Structure-function relationship and genomic and nongenomic actions of the steroid hormone receptor family; basis for actions of novel new ligands on these receptors. Offered spring semesters. Same as PCOL:6209, MPB:6209.

**NSCI:6240 Topics in Cognitive Neuroscience** 1-3 s.h.
Key topics in the neural basis of human cognition; research literature. Recommendations: graduate courses in basic neuroscience and cognitive psychology. Same as NEUR:6240.

**NSCI:6250 Functional Magnetic Resonance Imaging** 2-3 s.h.
Basic physics principles of functional magnetic resonance imaging and approaches to data acquisition, including BOLD imaging, arterial spin labeling, and magnetic source imaging; data analysis strategies; paradigm design and development.

**NSCI:6265 Neuroscience Seminar** 0-1 s.h.
Research presentations. Offered fall and spring semesters. Same as PSY:6265, ACB:6265, MPB:6265, BIOL:6265.

**NSCI:7235 Neurobiology of Disease** 3 s.h.
Broad, thematic understanding of disease mechanisms in neurobiological disorders.

**NSCI:7301 Directed Study in Neuroscience** arr.
Requirements: neuroscience graduate standing.

**NSCI:7305 Neuroscience Research** arr.