

# Neuroscience

## Chair

- Daniel T. Tranel (Neurology/Psychological and Brain Sciences)

**Graduate degree:** Ph.D. in neuroscience

**Faculty:** <https://neuroscience.grad.uiowa.edu/faculty/directory>

**Website:** <https://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 the behavioral/cognitive.

## Programs

### Graduate Program of Study

#### Major

- Doctor of Philosophy in Neuroscience

## 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 and Molecular Biology, Internal Medicine, Molecular Physiology and Biophysics, Neurology, Pharmacology, and Psychiatry; the College of Liberal Arts and Sciences Departments of Biology, Communication Sciences and Disorders, Health and Human Physiology, and Psychological and Brain Sciences; and the Neuroscience Program.

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

### Neuroscience Courses

#### **NSCI:4353 Neurophysiology: Cells and Systems 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:1380 or MATH:1550 or MATH:1850) and ((PHYS:1511 and PHYS:1512) or (PHYS:1611 and PHYS:1612)). Same as BIOL:4353.

#### **NSCI:5212 Foundations in Behavioral and Cognitive Neuroscience 4 s.h.**

Concepts, methods, and findings in behavioral and cognitive neurosciences. Prerequisites: BIOL:3253. 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 NEUR:5365, PSY:5365.

#### **NSCI:5653 Fundamental Neurobiology I 3 s.h.**

Neurobiology from molecular/cellular to systems levels, including cell biology of the neuron; membrane electrophysiology; synaptic transmission and plasticity, functional neuroanatomy, sensory, motor and autonomic systems; emotion, memory, sleep, language, attention and cognition, neuronal development; focus on systems and developmental neurobiology; first in a two-semester sequence. Same as BIOL:5653, PSY:5203.

#### **NSCI:5658 Fundamental Neurobiology I Discussion 1 s.h.**

Discussion of selected papers, including classics from neurobiology literature; coordinated with BIOL:5653 lecture material. Same as BIOL:5658, PSY:5204.

#### **NSCI:6050 Advanced Quantitative Training for Neuroscience 4 s.h.**

Review of statistical inference, type-I errors, statistical power, measurement reliability issues in context of between-/within-subjects t-tests, ANOVAs, correlations, and regressions with attention to causality and generalizability; multiple linear regression, model building, model testing, confounding/mediation, interactions; mixed models with nested/crossed, fixed/random factors, and repeated measure designs. Offered spring semesters. Prerequisites: PSY:5050.

#### **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 of even years. Same as MPB:6209, PCOL:6209.

#### **NSCI:6265 Neuroscience Seminar 0-1 s.h.**

Research presentations. Same as ACB:6265, BIOL:6265, MPB:6265, PSY:6265.

#### **NSCI:7235 Neurobiology of Disease 3 s.h.**

Broad, thematic understanding of disease mechanisms in neurobiological disorders. Same as NEUR:7235.

#### **NSCI:7301 Directed Study in Neuroscience arr.**

#### **NSCI:7305 Neuroscience Research arr.**

Requirements: neuroscience graduate standing.