

# BIOL 325: Human Neuroscience I

This course will use a systems neuroscience approach to understanding the relationship between the structure and function of the human brain. Course material will span the level of cellular neurophysiology of neurons and synaptic signaling to circuits and brain regions involved in sensory processes, motor function, emotion, attention, and learning and memory. Neuroanatomy will be emphasized throughout the course. Deviation from normative structure and function will be considered through clinical case studies and translational research. Although the focus of this course will be the human brain, research from animal models, particularly non-human primates and rodents, will be included in the investigation of neuronal mechanisms.

## Learning Objectives

- Identify neuroanatomical landmarks of the human brain in schematic illustrations, magnetic resonance images, and micrographs of sections of post-mortem tissue
- Analyze clinical cases and evaluate which neural regions are likely to be involved in symptoms and injury
- Describe basic neurophysiological properties and be able to explain: how the properties of the neuronal membrane relate to changes in potential and salutatory conduction of action potentials; the evidence for quantal transmission of chemical signals at the synapse; and the effects of various neurotoxins on receptor-binding kinetics or neurotransmission
- Apply knowledge of receptive fields, neuronal 'tuning,' neuronal codes, and topographic maps to compare and contrast the structural and functional properties of the somatosensory, motor, and sensory systems
- Think critically about scientific investigations by participating in an online discussion of scientific papers, giving careful consideration to potential confounds, alternative explanations, significance of findings, and unanswered questions for future inquiry

**Credits:** 2

**Class Type:** Graduate Course

**Prerequisites:**

Prior introductory biology coursework is encouraged; supplemental materials will be available for students who have not had a prior introduction to biophysical properties of cell membranes and cell signaling processes.

**Program:** Biology, Genetics, and Medicine

**Availability** Fall 2021

**Session** Session A