Neuroscience

Neuroscience is the study of the brain. The methods of Neuroscience come from biology, biochemistry and psychology. The goal of Neuroscience is to understand how networks of neurons can account for behavior. Neuroscience has practical applications in medicine – particularly for mental illnesses, addiction, stroke and communication disorders. Neuroscience has important implications for psychiatry, psychology, teaching and economics.

Knowledge

All neuroscience majors will demonstrate knowledge of the basic electrical, anatomical and dynamic properties of neurons and the way they function in networks.

Major topics include:

- the structure and function of ion channels
- the way in which channels produce neural activity
- the properties of neurotransmitter systems and their pharmacology
- the properties and anatomical location of brain circuits responsible for particular functions
- the properties of synapses and the mechanisms of synaptic plasticity that underlie learning
- the developmental principles that lead to the formation of brain networks
- the basis of neural codes by which neurons communicate
- the causes and mechanisms of various neurological disorders
- the basic properties of memory, perception and motor control

Skills

Students who major in neuroscience will have the opportunity to acquire skills in:

1. Experimental laboratory work. Examples of general skills include pipetting and gel electrophoresis. More specific skills may be acquired by working in a research laboratory. These skills include brain dissection, tissue culture of neurons, techniques in optical and electron microscopy, and techniques in electrophysiology.
2. Quantitative methods. The ability to select and carry out appropriate statistical tests is necessary for any scientific research. Students interested in pursuing a research career should be able to use the scientific programming language, Matlab, to analyze data.
3. Critical thinking. The ability to form a hypothesis and then devise experiments to test that hypothesis is an important aspect of the scientific method. Students will also learn how to search, select from and evaluate scientific literature.
4. Presentation of ideas. Students will learn how to produce convincing written/oral arguments.

Social Justice

Scientific advances have produced profound changes in society and raised questions whose resolution depends on scientific literacy. Neuroscience training will equip students with the background to understand controversies related to their field (e.g. what is the meaning of “brain-dead”?).

Upon graduation

Neuroscience graduates have a wide range of career options open to them, such as medicine, work in the pharmaceutical industry, academic research, teaching, journalism and patent law.