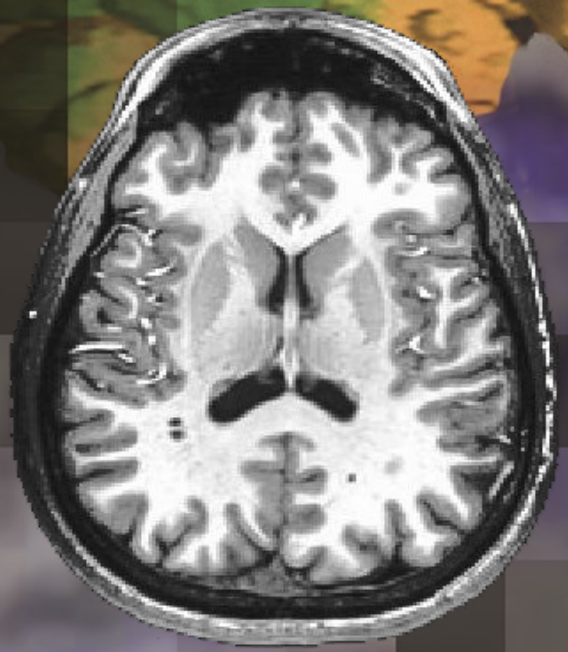
Neuroscience Program



SKIDMORE

What is Neuroscience?

Neuroscience is the scientific community's effort to understand the mechanisms that give rise to thoughts, motives, and behavior. The study of the nervous system can be pursued from biological, biochemical and psychological perspectives; as such, neuroscience is a thoroughly interdisciplinary endeavor that blurs the traditional barriers between such specialties. Neuroscientists investigate the connections between events that occur at the subcellular level (molecular genetics and molecular biology), the cellular level (electrophysiology, cell histology), the systems level (developmental biology, neurophysiology, functional anatomy) and the behavior of the whole organism (animal behavior, cognitive psychology). Addressing the fundamental questions of neuroscience thus requires the collaboration of specialists in diverse fields.

The field of neuroscience is relatively new, and we are continually learning surprising aspects of how our brain functions. The faculty at Skidmore are interested in a diverse array of scientific questions, including: how genes regulate biological clocks and activity cycles, how cannabinoids impact adolescent brain development and adult behavior, how gene products guide the development of the spinal cord, how Alzheimer's disease and other neurodegenerative diseases can be understood at the molecular level, and how the two hemispheres of the brain process information differently.

The Major

Skidmore's neuroscience program, created in 2001, evolved from a 30-year-old Biology-Psychology interdepartmental major. The formation of the interdisciplinary neuroscience program represents a trend toward the diffusion of sharp boundaries between scientific disciplines. The neuroscience major at Skidmore, like many interdisciplinary fields, is growing rapidly; we currently graduate between 15-25 majors per year.

Skidmore's neuroscience major is primarily delivered by professors in neuroscience, biology, psychology, and chemistry. The major is designed to develop a strong sense of identity through shared research and classroom experiences, to provide early exposure to the breadth of research questions, methodologies, and issues within the field, and to guide students in independent research experiences with faculty. Many of our classes are laboratory based, and all feature the low student to faculty ratio typical of a liberal arts education.

The major prepares students for career paths that include graduate school, the health professions, research, and clinical work. Some of our recent graduates have taken research assistant positions at the Boston VA Medical Center, Princeton University, and McLean Hospital. Others are conducting research at the National Institutes of Health, and still others have been accepted in various M.D. and Ph.D. programs worldwide (please see our "Where are they now?" document for additional details).

How can you learn more?

Be sure to visit our web site to learn more about the program, the faculty, and the students who make us what we are!

http://www.skidmore.edu/neuroscience/

The Faculty & Specializations

Jennifer Bonner, Associate Professor of Biology. Nervous system development.

Jason Breeves, Assistant Professor of Biology. Endocrinology.

David Domozych, Professor of Biology. Microscopy, plant cell biology.

Denise Evert, Associate Professor of Psychology. Neuropsychology of attention.

Corey Freeman-Gallant, Professor of Biology. Evolutionary biology.

Rebecca Johnson, Associate Professor of Psychology. Psycholinguistics.

Sarita Lagalwar, Assistant Professor of Neuroscience. Neurodegeneration.

Hassan López, Associate Professor of Psychology. Behavioral neuroscience, psychopharmacology.

Tom O'Connell, Associate Professor of Computer Science. Algorithms, artificial intelligence.

Flip Phillips, Professor of Psychology. Computational modeling, vision.

Bernard Possidente, Professor of Biology. Genetics, biological clocks.

Monica Raveret-Richter, Associate Professor of Biology. Neurobiology, animal behavior.

Lucy Spardy, Assistant Professor of Mathematics. Computational modeling of biological systems, locomotion.

Chris Vecsey, Assistant Professor of Neuroscience. Cellular & molecular basis of sleep & memory.

The Facilities

Skidmore maintains a wide variety of research and teaching facilities used by neuroscience faculty and students. The program features several teaching laboratories outfitted with an array of tools for hands-on learning activities. These include dissection, physiological monitoring, computational modeling and simulation, microscopy, eye-tracking, and behavioral testing of laboratory rodents (mice and rats).

All neuroscience faculty operate laboratories centered around their particular research area. Many of these laboratories also provide students with the opportunity for significant collaborative research with the faculty throughout the year. This work frequently culminates in professional publication and/or conference presentation experience for the student.

The Curriculum

Core courses:
NS 101: Neuroscience: Mind & Behavior
NS 201: Cellular & Molecular Neuroscience
BI 105: Biological Sciences I: Unity of Life
BI 106: Biological Sciences II: Diversity of Life
CH 125: Principles of Chemistry
PS 202: Research Methods in Psychology I
One advanced research methods course
NS 277: Integrative Seminar

Elective courses:
PS 203: Research Methods in Psychology II
PS 213: Hormones & Behavior
PS 218: Cognition
PS 221: Clinical Psychopharmacology
PS 225: Perception
PS 231: Neuropsychology
PS 232: Introduction to Cognitive Science
BI 242: Molecular Biology
BI 244: Comparative Vertebrate Physiology
BI 245: Principles of Genetics
BI 247: Cell Biology
CH 222: Organic Chemistry II

NS 312: Molecules to Memory
NS 312: Sleep - a Neurobiological Approach
NS 312: Cerebellum & Movement Disorders
NS 315: Mechanisms of Alzheimer's Disease
PS 304: Physiological Psychology
PS 314: Psychology of Reading
PS 323: Psycholinguistics
PS 327: Computational Methods in PS/NS
PS 330: Research Methods in Memory
PS 341: Left Brain/Right Brain
PS 351: Vision in the Blind
BI 306: Mammalian Physiology
BI 311: Biological Electron Microscopy
BI 316: Animal Behavior
BI 341: Neurodevelopment
BI 342: Frontiers of Molecular Neuroscience
BI 344: Biological Clocks
BI 351: Advanced Cell Biology - Focus on Cannabis
BI 368: Advanced Light Microscopy
CH 341: Biochemistry
CS 305: Design & Analysis of Algorithms
CS 322: Artificial Intelligence

Independent research experiences:
NS 275: Introduction to Neuroscience Research
NS 371: Research Experience in Neuroscience
NS 375/376: Senior Research Project I/II

The Paths

Path 1: A Behavioral Neuroscience Focus

Within major: Consider these electives: BI 245 Principles Of Genetics, BI 316 Animal Behavior, BI 341 Neurodevelopment, BI 344 Biological Clocks, PS 213 Hormones and Behavior, PS 221: Clinical Psychopharmacology, PS 304 Physiological Psychology.
Beyond major: Additional electives from Psychology (e.g., PS 223 Evolutionary Psychology) and Biology (e.g., BI 302 Behavioral Ecology, BI 324 Evolution, BI 370 Computer Modeling of Biological Systems).

Path 2: A Cellular/Molecular Focus

Within major: Consider these electives: BI 242 Molecular Biology, BI 245 Principles Of Genetics, BI 247 Cell Biology, BI 342 Frontiers in Molecular Neuroscience, NS 315 Mechanisms of Alzheimer's Disease, NS 312 Molecules to Memory.
Beyond major: Additional courses from Biology (BI 360 Gene Expression I: DNA Metabolism, BI 363 RNA Metabolism) and Chemistry (CH 221 Organic Chemistry I, CH 222 Organic Chemistry II and CH 341 Biochemistry: Macromolecular Structure and Function With Lab).

Path 3: A Cognitive Neuroscience Focus

Within major: Consider these electives: PS 231 Neuropsychology, PS 218 Cognition, PS 225 Perception, PS 314 Psychology of Reading, PS 323 Psycholinguistics, PS 330 Research Methods in Memory, PS 341 Left Brain/Right Brain.
Beyond major: Additional courses from Computer Science (e.g., CS 106 Introduction to Computer Science I, CS 206 Introduction to Computer Science II)

Path 4: A Cognitive Science Focus

Within major: Consider these electives: PS 218 Cognition, PS 225 Perception, PS 232 Introduction to Cognitive Science, PS 327 Computational Methods in PS/NS.
Beyond major: Additional courses from Computer Science (e.g., CS 106 Introduction to Computer Science I, CS 206 Introduction to Computer Science II, CS 306 Computability, Complexity, and Heuristics) and Philosophy (e.g., PH 241 Mind, Thought, and Consciousness)

Path 5: A Health Professions Focus

Within major: Consider these electives: PS 231 Neuropsychology, BI 244 Comparative Vertebrate Physiology, BI 245 Principles Of Genetics, BI 247 Cell Biology, BI 306 Mammalian Physiology, CH 341 Biochemistry.
Beyond major: Additional courses from Chemistry (Organic Chemistry (CH 221 Organic Chemistry I, CH 222 Organic Chemistry II), Physics (PY 207 General Physics I, PY 208 General Physics II), Calculus (MA 111 Calculus I, MA 113 Calculus II) and English.

Note: Those students interested in pre-med and other health professions should consult with the Health Professions Advisory Committee for guidance in selecting courses.