

# NEUROSCIENCE MAJOR

The Neuroscience Major is compatible with diverse interests within the field. Students planning to declare a Neuroscience Major must first complete one foundational course in STEM (i.e., BIOL 161, CHEM 181, CSCI 131, MATH 135 or equivalent, NEUR 110, or PHYS 115) and one neuroscience-focused course.

The main emphases of the Neuroscience Major are:

- **Principles of Neuroscience and Scientific Inquiry:** Neuroscience is concerned with elucidating the principles and physical processes by which diverse nervous systems coordinate organismal function, survival, cognition, and behavior.
- **Broad-based Proficiency in STEM:** As an integrative discipline, neuroscience draws on knowledge and tools from multiple STEM disciplines (biology, chemistry, computer science, mathematics, physics, psychology, etc.) and applies them to understanding the structure and function of nervous systems at all levels of analysis.
- **Theoretical Grounding in the Assumptions of Scientific Inquiry:** Fundamental questions in neuroscience confront the mind-body problem, involve concepts that are not defined in physical terms (e.g., mind, memory, intention, and emotion), and pertain to the understanding of organismal life and human nature. A higher-order goal of the major is to support the intellectually sound application of neuroscience to address fundamental questions and societal challenges.

## Requirements

Majors must take 14 courses observing the following rules:

- The major must include at least 2 laboratory or project based courses at the 200+ level (#).
- Outside of NEUR courses, the maximum number of courses that may be used from any single department is 4. Foundations in STEM courses and research for credit (400-level) shall not count toward total courses from a department.
- No more than 2 courses may overlap between the neuroscience major and any other academic program (major, minor, or concentration) with the exception of courses in the Foundations in STEM category.
- One semester of research for credit can count as a major requirement (additional neuroscience course, elective, or historical or theoretical perspective course) and/or a laboratory or project-based course (#), subject to review and approval by the Neuroscience Program Director.

## Code Title

### Foundations in STEM: 6 required courses

These courses cover fundamental principles of STEM disciplines that are required for studying neuroscience.

BIOL 161	Introduction to Cell & Molecular Biology
CHEM 181	Atoms & Molecules
or CSCI 131	Techniques of Programming
MATH 135	Calculus 1 (or equivalent)
PHYS 115	Introductory Physics 1: Mechanics, Fluids and Waves
PHYS 116	Introductory Physics 2: Electromagnetism, Optics and Modern Physics
STAT 220	Statistics (or equivalent)

### Intermediate Neuroscience Core Courses: at least 1 course

These courses cover fundamental principles of neuroscience and reinforce connections between neuroscience and other STEM disciplines. They also introduce students to neuroscience research papers.

BIOL 269	Neurobiology Lecture (with or without optional BIOL 270 Neurobiology Lab) #
NEUR 210	Neuroethology with Physics #
NEUR 220	Neural Circuits & Systems #

### Additional Neuroscience Courses: 4 courses, at least one must be an advanced neuroscience course (\*)

These courses cover principles and topics in neuroscience. Intermediate Neuroscience Core Courses (listed above) may also count as Additional Neuroscience Courses; students are encouraged to use Intermediate Neuroscience Core Courses to fulfill this requirement. An academic advisor will guide the student in course selection to ensure breadth and depth appropriate for the student's interests.

BIOL 369	Experimental Approaches in Neurobiology *
BIOL 390	Physiology #
or BIOL 391	Physiology Lecture
CSCI 363	Computational Vision
NEUR 110	Introduction to Neuroscience
NEUR 310	Adv Seminar in Neuroscience *
PSYC 221	Physiology and Behavior
PSYC 222	Sensation & Perception
PSYC 235	Cognitive Neuroscience
PSYC 315	Biology of Mental Disorders *
PSYC 316	Drug Abuse: Brain and Behavior *
PSYC 321	Neuroanatomy & Behavior *
PSYC 327	Predictive Coding in the Brain *
PSYC 362	Cognitive Neuropsychiatry *

### Electives: 2 Courses

These courses cover scientific principles and broader topics relevant to neuroscience. Intermediate Neuroscience Core Courses or Additional Neuroscience Courses (listed above) may also count as electives.

BIOL 211	Anatomy & Physiology I #
BIOL 230	Developmental Biology #
or BIOL 232	Developmental Biology Lecture
BIOL 261	Genetics #
or BIOL 262	Genetic Analysis
BIOL 266	Cell Biology (with or without optional BIOL 268 Cell Biology Lab) #
BIOL 283	Evolution
BIOL 301	Biochemistry 1
or CHEM 301	Biochemistry
CHEM 221	Organic Chemistry 1 #
CHEM 231	Equilibrium & Reactivity #
CHEM 289	Advanced Organic Chemistry
CHEM 300	Instrumental Chemistry/Analytical Methods #
CHEM 309	Spectroscopy
CHEM 317	Nanotechnology
CSCI 307	Data Mining
CSCI 347	Artificial Intelligence
MATH 241	Multivariable Calculus
MATH 244	Linear Algebra

PHYS 221	Mathematical Methods and Scientific Computing in Physics
PHYS 223	Modern Physics (with or without optional PHYS 225 Modern Physics Lab) #
PSYC 223	Animal Learning
PSYC 236	Cognition & Memory
PSYC 338	Consciousness & Control
PSYC 356	Animal Cognition
STAT 225	Experimental Design
STAT 226	Bayesian Statistics
STAT 231	Linear Models
STAT 232	Categorical Data Analysis
STAT 375	Probability Theory
STAT 380	Statistical Computing
STAT 381	Statistical Learning

#### Historical or Philosophical Perspectives: 1 course

These courses cover questions about the conduct and purpose of science or specific issues in the scientific study of life and mind.

PHIL 227	Philosophy of Race
PHIL 250	Medical Ethics
PHIL 261	Philosophy Of Mind
PHIL 271	Philosophy of Science
PHIL 272	Philosophy Of Biology
PHIL 273	Philosophy Of Medicine
PHIL 289	Ethical Issues/Death & Dying
PSYC 305	History & Theory
PSYC 314	Science, Medicine & the Holocaust

## Additional Requirements and Advising Notes for Neuroscience Major

- The major must include at least 2 laboratory or project-based courses at the 200+ level (#).
- One semester of research for credit can count as a major requirement (additional neuroscience course, elective, or historical or theoretical perspective course) and/or a laboratory or project-based course (#), subject to review and approval by the Neuroscience Program Director.
- The maximum number of courses that may be used from any single department is 4. Foundations in STEM courses and research for credit (400-level) shall not count toward total courses from a department.
- For courses in the Foundations in STEM category, the corresponding departmental policy regarding AP credit will apply.