Requirements: Neuroscience

Natural Sciences

Neuroscience studies the basic functions of the brain and nervous system as well as brain-behavior relationships in order to understand the roles they play in regulating both animal and human behavior. A thorough knowledge of the functions of the nervous system is essential to understanding the vicissitudes of psychological experience, general behavior and clinical disorders. Therefore, the study of the nervous system and the brain — anatomically, physiologically and biophysically, at both the microscopic and macroscopic levels — is central to the Neuroscience Program.

In recent years, neuroscience has become the most rapidly developing interdisciplinary area in the sciences. This field integrates the knowledge, research methods and modern laboratory technology of biology, chemistry, psychology and other scientific fields toward the common goal of understanding animal and human behavior. For this reason, the program's curriculum and faculty reflect a diversity of subdisciplines within a variety of departments. A primary objective of this program is to prepare students for entrance into graduate training or research occupations in neuroscience, neurochemistry, neurobiology, anatomy, physiology, physiological psychology, clinical psychology, behavioral science and the health sciences (medicine and allied fields).

The Kenyon College faculty voted to change from Kenyon units to semester hours. This change will go into effect for all students who start at the College in the fall of 2024. Both systems will be used throughout the course catalog with the Kenyon units being listed first.

First-year and New Students

Students who are considering a concentration or a major in neuroscience should inquire about the program with any affiliated faculty members and consult with the department chair.

NEUR 212 is the entryway into the neuroscience curriculum. It begins by emphasizing that neuroscience is truly an interdisciplinary field. After covering brain evolution and the genetic basis of behavior, it reviews the organization of the nervous system and the processes responsible for neural conduction and synaptic transmission. This knowledge is then applied to a comprehensive examination of the neurochemical, sensory, motor, developmental, motivational, cognitive and emotional processes and structures that influence both normal and abnormal behavior.

Curriculum for the Major

The neuroscience major is intended primarily for students who are planning to attend graduate school in the many specialized fields of neuroscience, such as medical neuroscience, developmental neuroscience, cognitive neuroscience or behavioral neuroscience. It also is an excellent major for students who are seriously interested in pursuing research careers or becoming clinical practitioners concerned with the biochemical or the biopsychological aspects of the nervous system or behavior (e.g., psychopharmacology, psychiatry, clinical neuropsychology).

Requirements for the Major

Required Core Courses depends on required laboratory and chemistry course

Neuroscience Required Courses (four courses)

NEUR 212: Neuroscience
NEUR 250: Research Design & Analysis in Neuroscience
NEUR 305: Behavioral Neuroscience
or NEUR 307: Sensory Processes
NEUR 471: Topics in Neuroscience

Required Laboratories (Neuroscience/Biology/Psychology)

One of the following laboratory courses:

NEUR 350D: Experiential Molecular Neuroscience
NEUR 359D: Experimental Neurobiology
or two semesters of NEUR 385: Research in Neuroscience

Biology Required Courses (four courses)

BIOL 109Y: Introduction to Experimental Biology
BIOL 110Y: Introduction to Experimental Biology
BIOL 115: Energy in Living Systems
BIOL 116: Information in Living Systems

Chemistry Required Courses (one or two courses)

CHEM 122: Chemical Principles

CHEM 121: Introductory Chemistry
and CHEM 124: Introductory Chemistry II

Electives (four courses)

Two of the four elective courses must come from the neuroscience electives list. The other two can be additional courses from the list.

Neuroscience Electives

NEUR 265: Behavioral Neuroscience of Adolescence
NEUR 275D: Animal Cognition
NEUR 290: Functional Neuroanatomy
NEUR 295: Neuropsychology: Brain Disorders
NEUR 300: Neuroscience of Emotions
NEUR 302: Neuroethology and Comparative Psychology
NEUR 305: Behavioral Neuroscience (if not taken as core course)
NEUR 307: Sensory Processes (if not taken as core course)
NEUR 347: Psychopharmacology
NEUR 351: Molecular Neuroscience
NEUR 363: Hormones and Behavior
NEUR 395D: Neurophilosophy of Consciousness
BIOL 358D: Neurobiology

Biology Electives

BIOL 243: Animal Physiology
BIOL 255: Genetic Analysis
BIOL 261: Animal Behavior
BIOL 263: Molecular Biology
BIOL 266: Cell Biology
BIOL 321: Evolutionary Developmental Biology

Chemistry Electives

CHEM 256: Biochemistry

Psychology Electives

PSYC 201: Cognitive Psychology
PSYC 206: Psychology of Language
PSYC 210: Social Mind, Social Brain
PSYC 310: Cognitive Neuroscience

Philosophy Electives

PHIL 245: Philosophy of Natural Science
PHIL 260: Philosophy of Mind and Brain
PHIL 262: Philosophy of Perception

Requirements for the Concentration

Neuroscience Required Courses (three courses)

NEUR 212: Introduction to Neuroscience
NEUR 305: Behavioral Neuroscience or NEUR 307: Sensory Processes
NEUR 250: Research Design & Analysis in Neuroscience

Basic Science Required Courses (three courses)

BIOL 115: Energy in Living Systems
BIOL 116: Information in Living Systems

And one of the following chemistry courses:

CHEM 109: Neurochemistry
CHEM 121: Introductory Chemistry
CHEM 122: Chemical Principles

Electives

Two additional advanced courses from the elective list above for the major.

Senior Capstone

The Senior Capstone consists of an original research proposal, written in a format of the National Science Foundation Graduate Research Fellowship Program grant. The capstone is completed in the fall of the student's senior year and is evaluated by two members of the neuroscience department faculty.

Research

Students can gain research experience by participating in independent research (NEUR 385) under the supervision of a faculty advisor. Although independent research is not required for the major, conducting research is a valuable educational experience, particularly for students planning to pursue graduate or medical training.

Honors

Seniors participating in the Honors Program (NEUR 497Y-498Y) must complete an honors project and pass an oral exam. Assessment of the honors candidate is conducted by the thesis advisor, two additional members of the neuroscience department and an outside examiner.

NEUR Courses and Diversification Requirements

Any two neuroscience courses may be paired to satisfy the natural science diversification requirement.

Transfer Credit Policy

All transfer credit to be counted for the Neuroscience major or concentration must be approved by the department chair. Students studying in off-campus programs must consult with the department chair in advance for any credit to be counted towards the Neuroscience major or concentration. Students may count one upper-level lab course and up to two upper-level lecture courses (but no more than one Neuroscience-focused course) as transfer credit for electives in the Neuroscience major or minor.

Courses in Neuroscience

Fundamentals of Neuroscience: Film, Space and Play
NEUR 105 Credits: 0.5/4
This introductory course will explore a range of topics and issues in the study of neuroscience. Specifically, the course will focus on the relationship between neuroscience, the arts and humanities. The course will treat the humanities and sciences as partners working together on the same problems. Usually, three topics are covered per semester. Examples of topics covered include the neuroscience of emotions, play behavior, film, visual and artistic perspective, space

and time. Other topics may be covered. Assignments will include weekly quizzes, class discussion and a thesis paper. This is a non-majors introductory course geared towards first-year and sophomore students, although others may take it. This course is repeatable for credit one time. This course paired with any neuroscience course counts toward the natural science diversification requirement. No Prerequisites.

Neuroscience of College Life: Sleep and Stress
NEUR 115 Credits: 0.5/4
This course will examine the brain physiology of stress and sleep, the impact of these systems on everyday human behaviors and functions, and the impact of everyday human behaviors on sleep and stress. Sleep and stress interactions with physiological systems relevant to physical and mental health will be studied. We will look specifically at the interactions of nutrition, screen use, and studying (learning and memory) with both sleep and stress, and discuss their implications for both personal behavior and public policy. This course is designed for first year students: some emphasis will be placed on discussing the neuroscience of current research on stress management, sleep interventions, study techniques, and other issues affecting and affected by college life. Student projects will include reflective engagement on the course topics and the development of techniques to apply what is learned. This is a non-majors introductory course. This course paired with any neuroscience course counts toward the natural science diversification requirement. Open only to first-year students. No prerequisite.

Neuroscience of Decision-Making
NEUR 116 Credits: 0.5/4
The process by which we make decisions, from everyday trivial choices to life-changing decisions, is as complex and fascinating as it is important. Accordingly, at the biological level, it offers an exceptional opportunity to analyze how the brain integrates external cues and our own internal drives when choosing. From the many factors involved, this course focuses on the contribution of three particular dimensions of decision-making: the influence of what we learn and remember, the weight and influence of our feelings whenever we face a choice, and our brain's evaluation of the information the world offers to us. We learn how these cognitive and neural systems (learning and memory, emotion and motivation, and cognitive control) interact with one another with the ultimate goal of better understanding our own decisions. This course paired with any neuroscience course counts toward the natural science diversification requirement. First-year students only. No prerequisite.

Neuroscience
NEUR 212 Credits: 0.5/4
This course begins with a definition of neuroscience as an interdisciplinary field, in the context of the philosophy of science. After covering the basics of cellular neurophysiology, the course examines the development and organization of the human nervous system in terms of sensory, motor, motivational, emotional and cognitive processes. The neurological and biochemical

bases of various brain and behavioral disorders also are examined. This course paired with any neuroscience course counts toward the natural science diversification requirement. This course is required for the major. Prerequisite or corequisite: BIOL 115, BIOL 116 or equivalent. Offered every year.

Research Design & Analysis in Neuroscience
NEUR 250 Credits: 0.5/4
This course introduces students to the basic experimental design and data analysis approaches used when conducting research in neuroscience. It will provide you with an understanding of the ways in which neuroscientists design studies, analyze data and communicate the results of their investigations of the brain and its relationship to behavior. You will be exposed to the style and language of scientific writing through reading and critiquing primary sources of scientific information. We will also discuss ethical considerations in using human and non-human research subjects, the appropriate use of common parametric and non-parametric statistical tests, effective graphical representation of data, and factors that affect the analysis and interpretation of data such as small sample size, reliability, statistical rigor and chance. This course paired with any neuroscience course counts toward the natural science diversification requirement. This course is required for the major. Prerequisite: NEUR 212.

Behavioral Neuroscience of Adolescence
NEUR 265 Credits: 0.5/4
This course will examine the emerging scientific human and animal research findings of how the brain changes during adolescence. Coverage will include associated psychological and social functioning, including cognition, multi-tasking, emotional processing, sleep and some pathologies. With an emphasis on the vulnerability and resiliency of the adolescent brain, we will examine appetitive behaviors (e.g., drug use, gambling), risky decision making, changes in and management of daily mood and the onset of some psychiatric disorders in social and cultural contexts. We will connect these to the structural, functional and chemical changes in the brain during the second decade of life. While implications for clinical treatments will also be discussed, the primary emphasis will be normal development and some diseases that emerge in adolescence. This course paired with any neuroscience course counts toward the natural science diversification requirement for the major. This counts toward the Biology elective requirement. Prerequisite: NEUR 212 or PSYC 100.

Animal Cognition
NEUR 275D Credits: 0.5/4
This course is the same as PSYC 275D. Can ants count? Can gorillas "converse" about the past or the future? Do crows use tools? Can dogs read human faces to detect our mood or follow our gaze for guidance or direction? These are the types of questions we will be considering in this seminar on animal cognition. We will examine how various cognitive abilities evolved in non-human animals and the purpose these abilities serve in their lives. Additionally,

we will explore the implications of animal cognition for our own cognitive abilities. General topics we will discuss include memory, learning, conceptual abilities, spatial cognition, numerical competence, planning, social intelligence, communication and language, animal culture, and self awareness and theory of mind in non-human animals. This course can be used as an elective towards the neuroscience major or concentration. This counts toward the elective requirement for the major. This course paired with any neuroscience course counts toward the natural science diversification requirement. Prerequisite: PSYC 100, 110 or NEUR 212.

Functional Neuroanatomy
NEUR 290 Credits: 0.5/4
Human beings, like virtually all other animals, sense our environment and act on it depending on the information we gather and our own internal needs. We are able to monitor internal and external cues, and select appropriate responses, thanks to our highly organized and complex nervous system. In this course, we analyze the structure and the organization of the nervous system. Our ultimate goal is understanding how the nervous system's complexity relates to many of its functions. We explore the organization of the nerves that allow us to sense the external world and our own internal environment, as well as the nerves that allow us to move. We learn how the spinal cord's components receive, regulate, and pass along information. We examine the brain and all its different levels of organization, from the brainstem to the cortex, and the functional implication of said organization. Finally, we inspect the several protection mechanisms that keeps the brain from being damaged, from mechanical injury to intoxication. Prerequisite: PSYC100, PSYC 110, or NEUR 212.

Neuropsychology: Brain Disorders
NEUR 295 Credits: 0.5/4
This course is designed to facilitate our learning about the connections and interactions among neuroanatomy, brain function and psychological phenomena. We do this by studying neuropsychological disorders, as well as the basic psychological processes such as perceptions and memory. Through readings, discussions and class presentations, we will learn some of the basic principles of the brain's organization and function, as well as its ability to recover function after damage. In addition, we will learn about the nature, causes and treatment of specific neuropsychological disorders such as Parkinson's disease, Alzheimer's disease, closed head injuries, Tourette's syndrome and stroke-induced aphasia. Further, we will learn about neuropsychological assessment and the current level of research and discovery in the neuropsychology of specific disorders through student presentations. This course paired with any neuroscience course counts toward the natural science diversification requirement. This counts toward the elective requirement for the major. Prerequisite: PSYC 100 or 101 or NEUR 212. Sophomore standing. Offered at least every other year.

Neuroscience of Emotions
NEUR 300 Credits: 0.5/4

Emotions are physiological and subjective states that give us a better chance for adaptation. In this course, we explore in depth the physiological aspect of emotions. Starting from the quintessential theories of the physiology of emotion (such as the James-Lange and the Cannon-Bard theories), we cover the basics of how the brain generates and regulates emotions, from the amygdala to the prefrontal cortex, and in relation to common emotional experiences (such as reward and fear). We understand the contribution of specific neurochemical systems to normal and altered emotional states. We review the variability of emotion across different factors (such as age or even species). Finally, we analyze the importance of the physiology of emotion in fascinating topics such as consumer behavior, the enjoyment of art, and addiction. This course counts as an elective for the major. Prerequisite: PSYC100, 110, or NEUR 212.

Neuroethology and Comparative Psychology
NEUR 302 Credits: 0.5/4
Until Darwin published his theory of evolution, it was commonly accepted that a huge gulf exists between human and nonhuman animals. In this course we will examine human and animal behavior and mental activity from an evolutionary perspective — that is, from a perspective in which humans are part of the continuum of life forms that inhabit the planet. We will consider the notion that, in contrast to the usual anthropocentric view of behavior and mental processes, many of the same evolutionary, ecological and biological principles explain both human and animal behavior. This course paired with any neuroscience course counts toward the natural science diversification requirement. This counts toward the elective requirement for the major. Prerequisite: NEUR 212 or PSYC 100 and 250. Offered at least every other year.

Behavioral Neuroscience
NEUR 305 Credits: 0.5/4
This course is designed to provide the student with an understanding of the physiological phenomena responsible for psychological experiences. The main focus of the course is a detailed study of the anatomy and physiology of the nervous system. This is followed by a study of the sensory and self-regulatory systems, a study of higher cognitive processing. With each new topic, the relevant anatomical and physiological systems will be discussed as they relate to the behavior under scrutiny. Thus the biological underpinnings of sleep, mood, learning and memory, motivation and other topics will be studied. This course paired with any neuroscience course counts toward the natural science diversification requirement. This counts toward the elective requirement for the major. Prerequisite: PSYC 100, 110 or NEUR 212. Generally offered every year.

Sensory Processes
NEUR 307 Credits: 0.5/4
This course focuses on the ways in which the brain gathers, processes and interprets information from the external environment in order to construct an internal representation that the organism perceives to be "reality." The goal is to provide students with an understanding of

the evolution, structure and function of various sensory systems as well as an understanding of how the brain interprets incoming sensations and turns them into perceptions that allow organisms to act on their environment. This course paired with any neuroscience course counts toward the natural science diversification requirement. This counts toward the elective requirement for the major. Prerequisite: NEUR 212. Sophomore standing. Generally offered every year.

Psychopharmacology
NEUR 347 Credits: 0.5/4
This course explores the biological mechanisms of the actions and effects of both legal and illegal psychoactive drugs. The course begins with a brief discussion of the history of psychopharmacology, followed by an in-depth examination of the biological basis of drug action in the brain. We will discuss the basis of drug classification and of specific drugs, including illicit drugs such as cocaine, amphetamines and heroin as well as legal psychoactive drugs such as caffeine, nicotine and alcohol. The course ends with a discussion of the action of drugs used in the treatment of mental disorders such as schizophrenia (antipsychotics) and depression (antidepressants). This course is cross-listed with psychology for diversification purposes. NEUR 305 is recommended but not required. This course paired with any neuroscience course counts toward the natural science diversification requirement. This counts toward the elective requirement for the major. Prerequisite: PSYC 100 or NEUR 212.

Experimental Molecular Neuroscience
NEUR 350D Credits: 0.25/2
his laboratory course is the same as BIOL 350D. It is designed to complement NEUR 351D Molecular Neuroscience. We will apply concepts of gene expression and neural patterning to design and conduct a series of authentic experiments to answer a novel research question. Students use foundational techniques in the field, including recombinant gene technology, visualization of gene expression, and microscopy in intact vertebrate animals. This course counts toward the upper-level laboratory requirement for the Biology and Neuroscience majors. Prerequisite: BIOL 109-110Y; prerequisite or corequisite: NEUR/BIOL 351 Molecular Neuroscience. Offered every two years.

Molecular Neuroscience
NEUR 351D Credits: 0.5/4
This course is the same as BIOL 351D. This course builds upon foundational concepts in neuroscience and biology to study key genes and signaling pathways that drive development, maintenance, communication, and plasticity of neurons and glia. Basic principles covered include differential gene expression in the nervous system, biochemical properties of ion channels and receptors, and the role of regulatory/transport proteins in neurons and glia. We will apply these and other concepts to sensory, motor, and behavioral aspects of the nervous system, studying both normal and abnormal development and function in model organisms. The

course emphasizes understanding historical and modern experimental design and molecular techniques. Critical reading and discussion of primary literature is an integral part of this class. This counts as an elective for the major. Prerequisite: 200- or 300-level NEUR course or 200-level BIOL course in the cell/molecular or organismal/physiology field.

Neurobiology
NEUR 358D Credits: 0.5/4
This course is the same as BIOL 358D. The study of the nervous system is a field that has experienced explosive growth in the past few decades. This course is designed to introduce the student to modern neurobiology by covering the basic foundations as well as the latest results from current research. Subject matter will range from the biophysics of membranes and ion channels, through sensory integration and simple behaviors, to the development of the nervous system. Rather than cover a wide variety of topics superficially, we will concentrate more time on selected topics that illustrate the current thinking of neurobiologists. Experience in math and/or physics is strongly recommended. This course paired with any neuroscience course counts toward the natural science diversification requirement. This counts as an elective for the major. Prerequisite: BIOL 116 and at least one biology lecture course at the 200-level or one 300-level NEUR lecture course. Generally offered every other year.

Experimental Neurobiology
NEUR 359D Credits: 0.25/2
This course is the same as BIOL 359D. This is a laboratory designed to complement the lecture course. We will concentrate either on the different intracellular and extracellular electrophysiological recording techniques commonly used in the field to illustrate both motor and sensory aspects of nervous-system function or on the molecular aspects of nervous system function molecular. We will conclude with a series of independent projects that will bring together the ideas covered earlier in the course. This counts toward the upper level lab requirement for the major. Prerequisite: BIOL 109Y-110Y. Prerequisite or corequisite: BIOL 358. Generally offered every other year. This counts toward the upper level laboratory requirement.

Hormones and Behavior
NEUR 363 Credits: 0.5/4
This course explores the relationships between hormones and the nervous system. Using a systems-level approach, we examine hormone-brain interactions involved in reproduction, stress, parenting and biological rhythms, focusing on examples from mammalian species. We begin with classical neuroendocrine examples and branch into recent findings, with reading and discussion of primary literature as an integral part of the course. This course paired with any neuroscience course counts toward the natural science diversification requirement. This counts toward an elective requirement for the major. Prerequisite: NEUR 212.

Research in Neuroscience
NEUR 385 Credits: 0.25/2
This combined discussion and laboratory course aims to develop abilities for asking sound research questions, designing reasonable scientific approaches to answer such questions, and performing experiments to test both the design and the question. We consider how to assess difficulties and limitations in experimental strategies due to design, equipment, system selected, and so on. The course provides a detailed understanding of selected modern research equipment. Students select their own research problems in consultation with one or more neuroscience faculty members. This course is designed both for those who plan to undertake honors research in their senior year and for those who are not doing honors but who want some practical research experience. A student can begin the research in either semester. When a year of credit is earned, it may counts toward the research methods course requirement for the major. This course is repeatable for up to 1.50 units of credit. Prerequisite: BIOL 109Y-110Y and NEUR 212. Permission of instructor required.

Neurophilosophy of Consciousness
NEUR 395D Credits: 0.5/4
This course is the same as PHIL 395D. This course must be taken as PHIL 395D to count towards the humanities diversification requirement. In the last 20 or so years, a formal collaboration has developed between the disciplines of neuroscience and philosophy. The interaction has led to dramatic changes in both disciplines. It turned out that philosophers have made a number of assumptions that do not withstand empirical scrutiny given the new experimental techniques of neuroscience. And it turned out that neuroscientists through this collaboration were able to identify conceptual errors in their discipline. The success of this interaction has led to a new thinking, particularly in the study of consciousness. In this course, we will be examining this collaborative literature. We will be reading only primary sources. Students will be expected to participate in the current debate. Students must have a major background in either philosophy or neuroscience. This course paired with any neuroscience course counts toward the natural science diversification requirement. This counts toward the major as a Philosophy elective. Prerequisite: junior standing and permission of instructor.

Research Methods in Electrophysiology and Biopotentials
NEUR 401 Credits: 0.25/2 QR
This methods course teaches students the skills necessary for conducting research in biopsychology and neuroscience. Students will gain first-hand experience with a number of concepts and measurement techniques as well as an understanding of the ways in which biopsychologists and neuroscientists investigate the brain and its relationship to behavior. Students will learn to design experiments; collect, analyze and present data using computer software packages; and write a scientific paper. This counts toward the laboratory requirement for the major. Prerequisite: NEUR 212 or PSYC 200 and permission of instructor.

Research Methods in Behavioral Neuroscience
NEUR 405 Credits: 0.25/2 QR
This is a laboratory methods course that focuses on research methods used in physiological psychology and behavioral neuroscience. The emphasis of the course will be on designing, conducting and presenting research, as well as on mastering specific laboratory techniques. The primary goal is to examine the relationships between brain chemistry and behavior. To this end, students will design and implement projects that examine these relationships using animal subjects. The course also will focus on data analysis and experimental design. Prerequisite: PSYC 100 and 250 or NEUR 212 and NEUR 305 or 347 or permission of instructor. Generally offered every other year.

Research Methods in Sensory Processes
NEUR 406 Credits: 0.25/2 QR
This methods course teaches students the skills necessary for conducting research in sensation and perception. It will give students first-hand experience with a number of concepts and measurement techniques as well as an understanding of the ways in which sensory neuroscientists investigate how the brain gathers, processes, and interprets information from the external environment to construct an internal representation of reality. Students will learn to design experiments; collect, analyze and present data using computer software packages; and write a scientific paper. This counts toward the laboratory requirement for the major. Prerequisite: NEUR 212 or PSYC 200 and PSYC 301. Prerequisite or corequisite: NEUR 305 or 307. Permission of instructor required. Generally offered every other year.

Topics in Neuroscience
NEUR 471 Credits: 0.5/4
This required capstone seminar is required of all students who plan to graduate with a neuroscience concentration or major. The seminar is intended to bring together the knowledge acquired from courses required for, or relevant to, the concentration and major. During the course of the semester, each student will write an integrative paper with input from the instructor. Oral presentations are given in conjunction with each of these exercises. Neuroscience majors are expected to have completed NEUR 250 before enrolling in NEUR 471. Prerequisite: NEUR 212, at least one 300-level neuroscience course. Neuroscience major or concentrator with senior standing. Permission of instructor required.

Individual Study
NEUR 493 Credits: 0.25-0.5/2-4
Students conduct independent research under the supervision of one of the faculty members affiliated with the Neuroscience Program. This course is restricted to juniors or seniors who are neuroscience majors or have taken (or are concurrently enrolled in) courses required for the neuroscience concentration. Because students must enroll for individual studies by the end of the seventh class day of each semester, they should begin discussion of the proposed individual

study preferably the semester before, so that there is time to devise the proposal and seek departmental approval before the established deadline. Permission of instructor and neuroscience director required.

Senior Honors
NEUR 497Y Credits: 0.5/4
This program for senior honors students culminates in the completion of a senior honors research project. The research is expected to be on a topic of particular relevance to the student's postgraduate plans. Students must select a research advisor from the faculty members in the Neuroscience Program. They are expected to have completed a thorough bibliographic search of the literature, written a short review paper and formulated some tentative hypotheses during the spring semester of their junior year. Permission of neuroscience director required. Prerequisite: 3.33 overall GPA and a 3.5 GPA in the neuroscience core courses and must have completed at least 5 units toward the major. Students enrolled in this course will be automatically added to NEUR 498Y for the spring semester.

Senior Honors
NEUR 498Y Credits: 0.5/4
This program for senior honors students culminates in the completion of a senior honors research project. The research is expected to be on a topic of particular relevance to the student's postgraduate plans. Students must select a research advisor from the faculty members in the Neuroscience Program. They are expected to have completed a thorough bibliographic search of the literature, written a short review paper and formulated some tentative hypotheses during the spring semester of their junior year. Permission of neuroscience director required. Prerequisite: 3.33 overall GPA and a 3.5 GPA in the neuroscience core courses and must have completed at least 5 units toward the major.

Fundamentals of Neuroscience: Behavioral Pharmacology
NEUR 95 Credits: 0.25/2

KAP Neuroscience of College Life: Sleep & Stress
NEUR 96 Credits: 0.25/2
This course will examine the brain physiology of stress and sleep, the impact of these systems on everyday human behaviors and functions, and the impact of everyday human behaviors on sleep and stress. Sleep and stress interactions with physiological systems relevant to physical and mental health will be studied. This course is designed for first year students: some emphasis will be placed on discussing the neuroscience of current research on stress management, sleep interventions, study techniques, and other issues affecting and affected by college life. Student projects will include reflective engagement on the course topics and the development of techniques to apply what is learned.

Concentration

Courses that meet the requirement for this concentration:

BIOL 115	Energy in Living Systems
BIOL 116	Information in Living Systems
BIOL 243	Animal Physiology
BIOL 255	Genetic Analysis
BIOL 261	Animal Behavior
BIOL 263	Molecular Biology
BIOL 266	Cell Biology
BIOL 321	Evolutionary Developmental Biology
BIOL 351D	Molecular Neuroscience
CHEM 109	Neurochemistry
CHEM 121	Introductory Chemistry
CHEM 122	Chemical Principles
CHEM 256	Biochemistry
PHIL 245	Philosophy of Natural Science
PHIL 260	Philosophy of Mind and Brain
PHIL 262	Philosophy of Perception
PSYC 200	Statistical Analysis in Psychology
PSYC 201	Cognitive Psychology
PSYC 206	Psychology of Language
PSYC 275D	Animal Cognition
PSYC 310	Cognitive Neuroscience