

# NEUROSCIENCE (NEUR)

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## **NEUR 110N - Introduction to Brain Diseases. 3 Credits.**

Offered spring. This course is designed to provide both non-science and science students with a basic understanding of brain diseases and injuries, such as spinal cord injury, Alzheimer's disease, Parkinson's disease, amyotrophic lateral sclerosis (ALS), epilepsy, depression, and addiction.

Gen Ed Attributes: Natural Science

## **NEUR 280 - Fundamental Neuroscience. 3 Credits.**

Prereq., BIOB 160 and BIOB 161N. Course will focus on the molecular and cellular underpinnings of the functions of the brain and nervous system. The topics will range from the basis of electrical and chemical signaling to the organization of the sensory systems and mechanisms involved in learning, memory, and complex behaviors.

## **NEUR 281 - Fundamentals of Neuroscience II: Cognition. 3 Credits.**

Offered spring. Prereq., NEUR 280. Explores the foundational understanding of the sensory systems, cognitive processing, perception, and memory. Specific topics include: the organization of sensory systems, the control of movement; mechanisms for learning, memory, and complex behaviors.

## **NEUR 292 - Independent Study. 1-6 Credits.**

(R-6) Offered intermittently. Prereq., consent of instructor. Independent study is designed to assist individual students in studying and understanding key topics in the neuroscience curriculum through individual mentoring, tutoring and/or self-directed learning.

## **NEUR 380 - Molecular Neuroscience. 3 Credits.**

Prereq., BIOB 260 and NEUR 280. The material covered will give students a practical knowledge of the subcellular organization and function of the nervous system. Students will learn how brain energy metabolism is a dynamic, and highly regulated process. We will explore the variety forms of neuronal chemical communication that may not conform to basic concepts of synaptic signaling. We will study processes that are involved in the growth and guidance of axons leading to the formation as well as the elimination of synapses. We will learn about the processes that are involved in the regulation of sexual differentiation of the nervous system. We will explore the basic mechanisms involved in learning and memory. Finally, Students will learn about the molecular and cellular mechanisms associated with neurodegenerative disease.

## **NEUR 390 - Undergraduate Research. 1-10 Credits.**

(R-10) Independent research under the direction of a faculty member.

## **NEUR 391 - Special Topics. 1-6 Credits.**

(R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

## **NEUR 392 - Independent Study. 1-6 Credits.**

(R-6) Offered intermittently. Prereq., consent of instructor. Independent study is designed to assist individual students in studying and understanding key topics in the neuroscience curriculum through individual mentoring, tutoring and/or self-directed learning.

## **NEUR 441 - CNS Diseases. 3 Credits.**

Offered autumn. Prereq., NEUR 280, BIOB 260, and BIOB 272. This course is designed as a special topics course within the new neuroscience major that focuses on developing an understanding of common diseases affecting the Central Nervous System (CNS), such as stroke, traumatic brain injury, Alzheimer disease, Parkinson's disease, schizophrenia, amyotrophic lateral sclerosis, epilepsy, etc.) For each of the CNS disorders surveyed (which will vary from year to year), an emphasis will be placed on framing the symptoms and etiology of the disease within the context of the normal neuronal function at the anatomical, cellular and molecular levels. Where feasible, lectures will be supplemented with presentations by clinicians with expertise in the field. Students will also develop an appreciation for the linkages between basic and translational research in neurological diseases as well as the importance of disease models in the development of new therapies. Level: Undergraduate

## **NEUR 458 - Neuroscience Research Techniques Lab. 4 Credits.**

Offered autumn. Restricted to Neuroscience majors with senior standing. Theory and practical experience in neuroscience experiment design, data collection, results analysis and report creation. Students will generally assist with ongoing research as well as attend formal classroom presentations and discussions. Students will be required to work with the course writing instructor to undertake the writing process and develop a primary literature review, an abstract and final report based on the experiments conducted and the data collected. Students with well-developed research ideas and skills may be allowed to undertake supplemental independent research. Level: Undergraduate  
Gen Ed Attributes: Writing in the Disciplines

## **NEUR 475 - Neuropharmacology. 3 Credits.**

Prereq.: NEUR 280, NEUR 380. This course will provide students with a better understanding of the chemical signaling systems in the brain, how these systems change in disease, and how drugs modulate their activity. The course should be of particular interest to Neuroscience, Pre-Med, Psychology, Chemistry, Biochemistry, and Human Biology majors. Level: Undergraduate/Graduate

## **NEUR 481 - Systems Neuroscience of Behavior and Cognition. 3 Credits.**

Prereq., PSYX 250 or NEUR 280. This course examines how collections of neurons work together to generate behavior and cognition. Basic principles of neuron circuits will be examined in the context of psychological constructs like spatial awareness, object recognition, planning, memory, and emotion. A particular focus of this class is the physiology of the forebrain, and understanding behavior by understanding how these systems "compute." Level: Undergraduate-Graduate

**NEUR 485 - Neurolinguistics. 3 Credits.**

This course will introduce students to Neurolinguistics, the study of language in the brain, reviewing theories of how language is processed in the mind and the organizational bases of language within the human nervous system. The course includes information on the history of neurolinguistics, modern techniques and methods of neurolinguistic research, and also provides detailed examples of several recent studies in the field. We will discuss how language maps onto the brain in "time" and "space" from the perspective of different theoretical models, examining linguistics components of sound, meaning, and structural processing, as well as the constraints of neurolinguistic models. Topics will include the neurophysiological aspects of first and second language acquisition/bilingualism, literacy, neurogenetics of language, the neuroethology of language, and clinical research in speech, reading, and writing disorders. In addition, students will gain a more general understanding of how to evaluate different theories of language and cognition. More specifically, students will gain practice in uncovering important questions about an area of interest, determining the appropriate methods to address these questions, and critically evaluating the conclusions drawn. Co-convenes with NEUR 585. Level: Undergraduate-graduate

**NEUR 490 - Undergraduate Research. 1-10 Credits.**

(R-10) Offered autumn. Prereq., senior standing in Neuroscience or consent of instructor. Theory and practical experience in neuroscience experiment design, data collection, results analysis and report creation. Students will generally assist with ongoing research as well as attend formal classroom presentations and discussions. Students will be required to work with the course writing instructor to undertake the writing process and develop a primary literature review, an abstract and final report based on the experiments conducted and the data collected. Students with well-developed research ideas and skills may be allowed to undertake supplemental independent research. Level: Undergraduate

**NEUR 491 - Special Topics. 1-6 Credits.**

(R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics. Level: Undergraduate

**NEUR 570 - Neuroscience Research Laboratory Rotations. 1-3 Credits.**

(R-6) Experience in research methods in Neuroscience research laboratories. CR/NCR grading only.

**NEUR 582 - Research Seminar Neuroscience. 1 Credit.**

(R-9) Offered autumn and spring. Oral and written presentations of experimental research results and selected literature topics in neuroscience. Level: Graduate

**NEUR 585 - Neurolinguistics. 3 Credits.**

Offered spring. This course will introduce students to Neurolinguistics, the study of language in the brain, reviewing theories of how language is processed in the mind and the organizational bases of language within the human nervous system. The course includes information on the history of neurolinguistics, modern techniques and methods of neurolinguistic research, and also provides detailed examples of several recent studies in the field. We will discuss how language maps onto the brain in "time" and "space" from the perspective of different theoretical models, examining linguistics components of sound, meaning, and structural processing, as well as the constraints of neurolinguistic models. Topics will include the neurophysiological aspects of first and second language acquisition/bilingualism, literacy, neurogenetics of language, the neuroethology of language, and clinical research in speech, reading, and writing disorders. In addition, students will gain a more general understanding of how to evaluate different theories of language and cognition. More specifically, students will gain practice in uncovering important questions about an area of interest, determining the appropriate methods to address these questions, and critically evaluating the conclusions drawn. Co-convenes with NEUR 485. Level: Undergraduate-Graduate

**NEUR 590 - Graduate Research. 1-10 Credits.**

(R-10) Independent research under the direction of a faculty member. Graded credit/no credit. Level: Graduate

**NEUR 591 - Special Topics. 1-6 Credits.**

(R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics. Level: Graduate

**NEUR 594 - Seminar. 1 Credit.**

(R-9) Offered autumn and spring. Oral and written presentations of experimental research results and selected literature topics in neuroscience. Level: Graduate

**NEUR 610 - Neuropharmacology. 3 Credits.**

Offered alternate years. Prereq., BMED 613 or NEUR 661 or consent of instr. Focus on current areas of research and research technologies in neuropharmacology. Development of presentations and research grant proposals. Level: Graduate

**NEUR 646 - Neurotoxicology. 3 Credits.**

Offered alternate years. Prereq., BMED 641 or NEUR 661. Mechanisms of major neurotoxins and neurological disease. Level: Graduate

**NEUR 661 - Neuroscience I. 4 Credits.**

Offered autumn. Prereq., BIOC 380 or equiv. Overview of the structure and function of the nervous system. Level: Graduate

**NEUR 662 - Neuroscience II. 4 Credits.**

Offered spring. Prereq., NEUR 661. Fundamentals of developmental neuroscience, behavioral and cognitive neuroscience and computational neuroscience. Level: Graduate

**NEUR 667 - Topics in Neurobiology. 1-3 Credits.**

(R-9) Offered every year. Prereq., NEUR 661. Current topics in neuroscience. Level: Graduate

**NEUR 690 - Graduate Research. 1-10 Credits.**

(R-10) Independent research under the direction of a faculty member. Graded credit/no credit. Level: Graduate