NEUROSCIENCE (NRSC)

Courses

NRSC 1020 (1) Exploring the Neuroscience Major
This course familiarizes students to the neuroscience major at CU Boulder, and helps students develop key skills needed for academic success. Students will learn about department and campus resources, and how to get involved in the wider neuroscience community, including clubs and research. An overview of select neuroscience-related topics, and possible career paths, helps students determine goodness of fit. This elective course is designed for first-year and other students exploring educational and career opportunities in this exciting field.

NRSC 2100 (4) Introduction to Neuroscience
Provides an introduction to fundamental concepts in neuroscience. The goal of this first course is to provide a strong foundation in neurobiology-cell biology, physiology of the neuronal membrane, interneuronal communication, neurotransmission, gross anatomy, and how the brain develops. Students will also learn principles of sensory systems functions. Recitation will reinforce lecture concepts through discussion of current research.
Requisites: Requires prerequisite courses of MCDB 1111 or MCDB 1150 or EBIO 1210 (minimum grade C-).
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 2101 (1-4) Topics in Neuroscience
Provides students with the opportunity to focus on a specific area of Neuroscience in depth.
Repeatable: Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 2125 (4) Introduction to Neuroscience I: Foundations
Provides an introduction to fundamental knowledge and principles in neuroscience. The goal of this first semester of an Introduction to Neuroscience two semester sequence is to provide a strong foundation in neurobiology-cell biology, physiology of the neuronal membrane, synaptic neurotransmission, neurochemistry, gross anatomy and introduction to sensory perception. Recitation will reinforce lecture concepts.
Requisites: Requires prerequisite course of MCDB 1150 or EBIO 1210 (minimum grade C-).

NRSC 2150 (4) Introduction to Neuroscience II: Systems
Extends understanding of fundamental knowledge in neuroscience with a focus on systems function. The goal of this second semester of an Introduction to Neuroscience two semester sequence is to develop deeper understanding of neurobiological systems function. Featured is the neurophysiology, neuroanatomy and function of human sensory systems, motor systems, sensorimotor integration and higher level neurosystem function.
Requisites: Requires prerequisite course of NRSC 2100 or NRSC 2125 (minimum grade C-).

NRSC 2200 (2) Laboratory Techniques in Neuroscience
Introduces students to many basic and essential laboratory skills in neuroscience research. Students will learn experimental methods and perform experiments depicting principles in neurophysiology, neuroanatomy, neurochemistry, and the fundamentals of neuroimaging techniques.
Requisites: Requires a prerequisite course of NRSC 2100 or NRSC 2125 (minimum grade C-). Restricted to Neuroscience (NRSC) majors only.
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 4011 (1-3) Senior Thesis
Senior Thesis credits are available for students during the semester that they write and defend a departmental Honors Thesis. A neuroscience honors thesis must be based on an empirical research project that the student directs/participates in under guidance from a faculty member. Contact the neuroscience director for further information.

NRSC 4015 (3) Affective Neuroscience
Experiencing and learning from affect--emotional value--is a fundamental part of the human experience. When people started thinking of brains as computers, research on emotion fell by the wayside. Recently however, this has changed, and there is an explosion of work on the brain mechanisms of affective value. Covers recent advances in understanding the emotional brain.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 5015
Requisites: Requires a prerequisite course of PSYC 2012 or (NRSC 2100 or (NRSC 2125 and NRSC 2150)) (minimum grade C-). Restricted to students with 57-180 credits (Juniors or Seniors).
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 4032 (3) Neurobiology of Learning and Memory
Provides a comprehensive treatment of how the brain acquires, stores, and retrieves memories. To do this we will consider (a) the methods used to address these issues, (b) what we know about how brain systems are organized to support memories of different types,and (c) the synaptic mechanisms that are involved.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 5032
Requisites: Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 4042 (3) Systems Neuroscience
Explores the neurophysiology, neuroanatomy and function of human sensory systems, motor systems, sensorimotor integration and higher level neurosystem function.
Requisites: Requires prerequisite of (PSYC 2012 or NRSC 2100 or (NRSC 2125 and 2150)) and one of the following (EBIO 1210 or MCDB 1111 or MCDB 1150) all require minimum grade of C-.
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 4062 (3) The Neurobiology of Stress
Provides an introduction to the concept of stress and the physiological systems involved. Factors modulating stress vulnerability versus resilience, and stress interactions with other systems with health relevance will be explored. Emphasis will be placed on current research on brain mechanisms. Formerly PSYC 4062.
Requisites: Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 4072 (3) Clinical Neuroscience: A Clinical and Pathological Perspective
Provides a review of the anatomy and physiology of the nervous system and then explores how alterations in these systems can result in neurologic or psychiatric disorders. Emphasizes pathological neuroanatomy, neurophysiology and neuropharmacology, which is essential for understanding problems related to health and disease.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 5072
Requisites: Requires a prerequisite course of (NRSC 2100 or (NRSC 2125 and NRSC 2150)) and (EBIO 2070 or MCDB 2150), (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior).
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 4082 (3) Neural Circuits of Learning and Decision Making
Provides an in-depth survey of the neural mechanisms of learning, motivated behavior and decision making. Analysis will focus on the interaction of neural circuits underlying these processes with particular attention to the cellular, molecular and information-processing aspects of identified pathways and considered into the context learning-based and neuroeconomic models of choice.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 5082
Requisites: Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 4092 (3) Behavioral Neuroendocrinology
Provides an introduction to neuroendocrinology with a focus on the interaction between hormones on brain development and behaviorally relevant brain function, including reproductive behaviors, stress, biological rhythms and mood.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 5092
Requisites: Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 4132 (3) Neuropharmacology
Study of drug action within the central nervous system. This course is designed to provide a fundamental understanding of the neurobiological and neurochemical mechanisms of drug action. Topics covered include the following: 1) principles of pharmacology; 2) brain neurotransmitter systems; 3) biochemical basis of psychiatric disorders and their pharmacological treatment.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 5132
Requisites: Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 4155 (4) Cognitive Neuroscience/Neuropsychology
Introduction to cognitive neuroscience and neuropsychology. Provides a survey of the neuropsychological underpinnings for a wide range of cognitive functions: vision, object recognition, attention, language, memory and executive function. One lab per week.
Equivalent - Duplicate Degree Credit Not Granted: PSYC 4155
Requisites: Requires a prerequisite course of PSYC 2111 and PSYC 3111 and (PSYC 2012 or NRSC 2100 or (NRSC 2125 and NRSC 2150)) (all minimum grade C-).
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sci Lab Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 4420 (3) Genetics of Brain and Behavior
Examines the genetic underpinnings of animal behavior, including an examination of behavioral evolution and the use of genes as tools to examine neural architecture. We will cover topics including foraging, social behavior, personality, parental care and fear. We will explore these behaviors at multiple levels, including genomics, population genetics, molecular genetics, epigenetics, endocrinology and neurobiology. Fulfills MCDB scientific reasoning requirement.
Equivalent - Duplicate Degree Credit Not Granted: MCDB 4420
Requisites: Requires NRSC 2100 or (NRSC 2125 and NRSC 2150) and (EBIO 2070 or MCDB 2150). All minimum grade C-.
Grading Basis: Letter Grade

NRSC 4542 (3) The Neurobiology of Mental Illness
Provides in depth study of what is known concerning the neurobiology of mental illnesses, with a focus on depression and anxiety. Consideration will be given to both animal models and human work, with neurochemical, circuitry level, and neuroinflammatory processes to be highlighted. There will be discussion of the intricacies of determining the effectiveness of pharmacological treatments, and what the implications of such treatments might be.
Requisites: Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-). Restricted to students with 57-180 credits (Junior or Senior).
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 4545 (3) Neurobiology of Addiction
Covers an intensive survey and synthesis of recent findings contributing to our understanding of the neurobiological basis of addiction. Analysis of both drug and behavioral addictions will be made at the molecular, cellular and neurocircuitry levels and synthesized into models utilizing common themes between various addictions and contributing pathologies.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 5545
Requisites: Requires prerequisite courses of (NRSC 2100 or (NRSC 2125 and NRSC 2150)) and NRSC 4132 (minimum grade C-).
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 4561 (1-3) Special Topics in Neuroscience
Presents and analyzes special interest topics from the broad and interdisciplinary field of neuroscience. The instructor determines the content of a particular section. Repeatable for up to 6 total credit hours.
Repeatable: Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
Requisites: Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
Additional Information: Arts Sci Gen Ed: Distribution-Natural Sciences

NRSC 4572 (3) Developmental Neurobiology
Examines the molecular and cellular processes that generate a functional nervous system. Topics covered include cell fate determination, neurogenesis and gliogenesis, cell migration, axon pathfinding, synapse formation and synapse refinement. Also explores how alterations in development can result in neurologic or psychiatric disorders. Formerly offered as a special topics course.
Requisites: Requires a prerequisite course of NRSC 2100 or (NRSC 2125 and NRSC 2150), (all minimum grade C-).
Recommended: Prerequisite or corequisite MCDB 3135.

NRSC 4841 (1-3) Independent Study in Neuroscience
Repeatable: Repeatable for up to 8.00 total credit hours.
Requisites: Restricted to students with 57-180 credits (Junior or Senior) Neuroscience (NRSC) majors only.

NRSC 5015 (3) Affective Neuroscience
Experiencing and learning from affect--emotional value--is a fundamental part of the human experience. When people started thinking of brains as computers, research on emotion fell by the wayside. Recently however, this has changed, and there is an explosion of work on the brain mechanisms of affective value. Covers recent advances in understanding the emotional brain.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 4015
Requisites: Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

NRSC 5032 (3) Neurobiology of Learning and Memory
Provides a comprehensive treatment of how the brain acquires, stores, and retrieves memories. To do this we will consider (a) the methods used to address these issues, (b) what we know about how brain systems are organized to support memories of different types,and (c) the synaptic mechanisms that are involved.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 4032
Requisites: Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
Additional Information: Departmental Category: Biological

NRSC 5072 (3) Clinical Neuroscience: A Clinical and Pathological Perspective
Provides a review of the anatomy and physiology of the nervous system and then explores how alterations in these systems can result in neurologic or psychiatric disorders. Emphasizes pathological neuroanatomy, neurophysiology and neuropharmacology, which is essential for understanding problems related to health and disease.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 4072
Requisites: Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
Additional Information: Departmental Category: Biological

NRSC 5082 (3) Neural Circuits of Learning and Decision Making
Provides an in-depth survey of the neural mechanisms of learning, motivated behavior and decision making. Analysis will focus on the interaction of neural circuits underlying these processes with particular attention to the cellular, molecular and information-processing aspects of identified pathways and considered into the context learning-based and neuroeconomic models of choice.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 4082
Requisites: Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
Grading Basis: Letter Grade

NRSC 5092 (3-4) Behavioral Neuroendocrinology
Provides an introduction to neuroendocrinology with a focus on the interaction between hormones and brain function. In addition to attending and meeting all the requirements for the lecture portion of the course, graduate students meet for an additional hour each week to discuss in depth behavioral neuroendocrinology relevant research articles.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 4092
Requisites: Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
Additional Information: Departmental Category: Biological

NRSC 5100 (3-4) Introduction to Neuroscience I
This first course in the year-long sequence of introduction to neuroscience provides an intensive introduction to the principles of neuroscience, covering detailed neuroanatomy, physiology, neurophysiology, neurochemical and developmental characteristics of the central nervous system. Structure-function relationships in sensory and motor systems are then explored with neuroanatomical and electrophysiological perspectives. Students enrolled in the Behavioral Neuroscience Program should enroll in this course for 4 credits. All other students should enroll in this course for 3 credits.
Requisites: Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students and students in the interdepartmental neuroscience program.

NRSC 5110 (3-4) Introduction to Neuroscience II
Provides an intensive interdisciplinary introduction to the principles of neuroscience. It is a sequel to NRSC 5100. Provides a detailed overview of neurochemistry, neurodevelopment, neuromotor control, neurogenetics, and cognitive neuroscience. Open to undergraduates with instructor permission. Students enrolled in the Behavioral Neuroscience Program should enroll in this course for 4 credits. All other students should enroll in this course for 3 credits.
Requisites: Requires a prerequisite course of NRSC 5100 or NRSC 4052 or PSYC 4052 (minimum grade C-). Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students and students in the interdepartmental neuroscience program.

NRSC 5132 (3) Neuropharmacology
Study of drug action within the central nervous system. This course is designed to provide a fundamental understanding of the neurobiological and neurochemical mechanisms of drug action. Topics covered include the following: 1) principles of pharmacology; 2) brain neurotransmitter systems; 3) biochemical basis of psychiatric disorders and their pharmacological treatment.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 4132
Repeatable: Repeatable for up to 6.00 total credit hours. Allows multiple enrollment in term.
Requisites: Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
Additional Information: Departmental Category: Biological

NRSC 5262 (3) Mammalian Neuroanatomy
Provides a detailed overview of peripheral and central nervous system connectional neuroanatomy targeted at delineating functional sensory, motor and motivational systems and the control of behavior and cognition. Emphasizes histological, anatomical and functional techniques employed in investigations of the nervous system. Formerly PSYC 5262.
Requisites: Requires a prerequisite course of NRSC 2100 or NRSC 5100 or NRSC 4052 or PSYC 4052 (minimum grade C-). Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
Additional Information: Departmental Category: Biological

NRSC 5545 (3) Neurobiology of Addiction
Covers an intensive survey and synthesis of recent findings contributing to our understanding of the neurobiological basis of addiction. Analysis of both drug and behavioral addictions will be made at the molecular, cellular and neurocircuitry levels and synthesized into models utilizing common themes between various addictions and contributing pathologies.
Equivalent - Duplicate Degree Credit Not Granted: NRSC 4545
Requisites: Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

NRSC 5911 (3) Teaching of Neuroscience
Offers a rich experience for students to develop and organize curriculum to complement the Neuroscience core courses. Offers a valuable teaching experience utilizing computational modeling to simulate experimental results. Any Neuroscience curriculum course, such as Intro to Neuroscience I or II, Neuropharmacology, Neurobiology of Learning and Memory or Behavioral Neuroscience may be appropriate.
Requisites: Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

NRSC 6000 (1-3) Introduction to Laboratory Methods
Introduces methodology and techniques used in biological research. Designed as a tutorial between a few students and one faculty member. Students are expected to read original research papers, discuss findings, and to gain training in techniques necessary to plan and execute experiments in selected areas. These include but are not limited to, for example, surgical approaches, behavioral techniques, molecular biology approaches, and imaging.
Repeatable: Repeatable for up to 15.00 total credit hours. Allows multiple enrollment in term.
Requisites: Restricted to Behavioral Neuroscience program graduate students.
Grading Basis: Letter Grade

NRSC 6100 (2) Advances in Neuroscience Seminar
Designed for beginning graduate students interested in neuroscience. Students read, discuss, and evaluate the primary literature on a number of current topics in neuroscience as well as attend the seminar program in neuroscience.
Repeatable: Repeatable for up to 8.00 total credit hours.
Requisites: Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

NRSC 6602 (1-3) Behavioral Neuroscience Professional Skills Development
Enrolled graduate students in the behavioral neuroscience program will be asked to prepare, present and receive feedback on scientific presentations of their own research or from review of a current research project.
Repeatable: Repeatable for up to 14.00 total credit hours. Allows multiple enrollment in term.
Requisites: Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.
Grading Basis: Letter Grade

NRSC 7102 (1-3) Topics in Neuroscience
Advanced seminar dealing with different specialized topics in neuroscience. Instructor consent required for students outside of the department.
Repeatable: Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
Requisites: Requires a prerequisite course of NRSC 5110 (minimum grade D-). Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.

NRSC 7152 (3) Special Topics in Neuroscience V
Advanced seminar dealing with several different specialized topics in Neuroscience.
Repeatable: Repeatable for up to 9.00 total credit hours. Allows multiple enrollment in term.
Requisites: Restricted to Psychology and Neuroscience (PSYC NRSC) graduate students.