NEUROSCIENCE (NEUROSCI)

NEUROSCI 101-7 College Seminar (1 Unit) Small, writing and discussion-oriented course exploring a specific topic or theme, and introducing skills necessary to thriving at Northwestern. Not eligible to be applied towards a WCAS major or minor except where specifically indicated.

NEUROSCI 101-8 First-Year Writing Seminar (1 Unit) Small, writing and discussion-oriented course exploring a specific topic or theme, and focused on the fundamentals of effective, college-level written communication. Not eligible to be applied towards a WCAS major or minor except where specifically indicated.

NEUROSCI 102-0 College and the Brain (1 Unit) Introduction to the neurobiology of learning and memory with a particular focus on aspects of college life. May not receive credit for both NEUROSCI 102-0 and NEUROSCI 101-6 or NEUROSCI 101-7 if seminar topic was Your Brain on College. *Natural Sciences Distro Area Natural Sciences Foundational Discipline*

NEUROSCI 202-0 Cellular and Molecular Neuroscience (1 Unit)
Introduction to principles governing nervous system function at the cellular and molecular level. May not receive credit for both NEUROSCI 202-0 and BIOL_SCI 302-0. Prerequisites: BIOL_SCI 201-0 (or NU Biology Placement Test) or BIOL_SCI 239-0. *Natural Sciences Distro Area*

NEUROSCI 206-0 Systems and Behavioral Neuroscience (1 Unit)
Introduction to the organization and function of brain systems and their role in generating behavior. Prerequisite: NEUROSCI 202-0 or NEUROSCI 311-0 or BIOL_SCI 302-0. *Natural Sciences Distro Area*

NEUROSCI 303-0 Molecular Mechanisms of Neuropsychopharmacology (1 Unit)
Advanced seminar focusing on molecular mechanisms and aberrations of synaptic signal transduction and drugs that target them.
Prerequisite: NEUROSCI 202-0 or NEUROSCI 311-0 or BIOL_SCI 302-0.

NEUROSCI 304-0 Developmental Neurobiology (1 Unit)
Embryology and cellular/molecular mechanisms of nervous system development. Topics include patterning of the early embryo and nervous system, neurogenesis, neuronal differentiation and cell fate specification, axon guidance and wiring of neural circuits, and activity-, experience-, and sex-dependent neurodevelopment.
Prerequisite: NEUROSCI 202-0 or NEUROSCI 311-0 or BIOL_SCI 302-0.

NEUROSCI 308-0 Genetics of Human Behavior (1 Unit)
Covers the genetic determinants of human behavior. We discuss how "nature" (genes) and "nurture" contribute to shape individual behavior and explore the implications of this interaction, from philosophical and ethical aspects to medical and legal considerations.
Prerequisites: NEUROSCI 202-0 or NEUROSCI 311-0 or BIOL_SCI 302-0.

NEUROSCI 311-0 Biophysical Analysis of Neurons for ISP (1 Unit)
This course provides an introduction to neurobiology from an electrophysiological perspective, with an emphasis on ion channel biophysics, quantitative electrical properties of neurons, synaptic physiology, and sensory transduction. Its goal is to provide a basis for understanding how information is encoded, transmitted, and decoded in brains, as well as offer an introduction to reading scientific literature. Some facility with simple equations and graphing is suggested.
Prerequisite: Students must be an ISP or NEUROSCI major to enroll.

NEUROSCI 320-0 Animal Behavior (1 Unit)
Animal behavior from the neuroscience perspective. Neurobiological bases of foraging, communication, migration, predator-prey interactions, mating, and parental care.
Prerequisites: NEUROSCI 202-0 and NEUROSCI 206-0; or NEUROSCI 311-0 and NEUROSCI 206-0; or BIOL_SCI 302-0.
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NEUROSCI 324-0 Neurobiology of Biological Clocks and Sleep (1 Unit)
General properties of sleep and circadian rhythms; how sleep and the circadian clock regulate a number of diverse activities at the cell, organ, and organism levels.The importance of biological rhythms and sleep for human health and disease will be covered in the course. Prerequisite: NEUROSCI 202-0 or NEUROSCI 311-0 or BIOL_SCI 302-0.

NEUROSCI 325-0 Neurobiology of Stress, Adversity, and Resilience (1 Unit)
This is a writing-intensive course based on class lectures and discussion that draws from primary literature on the neurobiology of stress, stress susceptibility and resilience, to explore biological mechanisms by which adversity can influence mental health and other outcomes.
Prerequisites: NEUROSCI 202-0 and NEUROSCI 206-0; NEUROSCI 311-0 and NEUROSCI 206-0; or BIOL_SCI 302-0.

NEUROSCI 326-0 Neurobiology of Learning and Memory (1 Unit)
This course examines how brain cells and neural circuits process experience to produce lasting changes in behavior. In depth discussion of original research findings, with a focus on the latest molecular, neural physiology, and behavioral studies. Prerequisites: NEUROSCI 202-0 and NEUROSCI 206-0; or NEUROSCI 311-0 and NEUROSCI 206-0; or BIOL_SCI 302-0.

NEUROSCI 340-0 Injury, Regeneration, and Recovery in the Nervous System (1 Unit) Why are non-mammalian vertebrates better than mammals at recovering from injury? Learn to delve into the cellular, molecular, and neuronal mechanisms that are involved in spinal cord regeneration. Develop skills to dissect, organize, and compile information from different sources into a coherent and logical story. Prerequisites: NEUROSCI 202-0 and NEUROSCI 206-0; or NEUROSCI 311-0 and NEUROSCI 206-0; or BIOL_SCI 302-0.

NEUROSCI 350-0 Advanced Neurophysiology Laboratory (1 Unit)
Learn to record electrophysiological signals (action potentials and post synaptic potentials) from living neural systems using amplifiers and recording equipment commonly found in research labs around the world. Prerequisites: NEUROSCI 202-0 and NEUROSCI 206-0; or NEUROSCI 311-0 and NEUROSCI 206-0; or BIOL_SCI 302-0; and consent of instructor.

NEUROSCI 355-0 Neurogenetics of Behavior Laboratory (1 Unit)
Project-based laboratory investigating the genetic basis of behavior in a simple model system; molecular genetic techniques used in neurobiology. Prerequisites: NEUROSCI 202-0 and NEUROSCI 206-0; or NEUROSCI 311-0 and NEUROSCI 206-0; or BIOL_SCI 302-0.

NEUROSCI 357-0 Neuroanatomy Laboratory (1 Unit) Comparative anatomy and dissection to understand the functions of brain regions by comparing their structures across the major vertebrate classes. Includes clinical anatomy and case studies to understand the functions of brain regions by drawing connections between neurological symptoms and the localization of lesions. Prerequisites: NEUROSCI 202-0 and NEUROSCI 206-0; or NEUROSCI 311-0 and NEUROSCI 206-0; or BIOL_SCI 302-0.

NEUROSCI 359-0 Neurotoxicology Laboratory (1 Unit) Gain practical lab experience on how to conduct studies using the scientific method, perform experiments to quantify behaviors and monitor neural activity, analyze di erent types of data, and improve communication skills.

Come satisfy your curiosity on the connection between commonly used chemicals, neurons, and behavior. Prerequisites: NEUROSCI 202-0 and NEUROSCI 206-0; or NEUROSCI 311-0 and NEUROSCI 206-0; or BIOL_SCI 302-0.

NEUROSCI 360-0 Neuroscience of Brain Disorders (1 Unit)
Survey of brain disorders and differences such as neurodegenerative diseases, developmental disorders, narcolepsy, and migraine with a focus on molecular-genetic mechanisms. Trace progress from the laboratory to the clinic, evaluate the state of knowledge, and understand future directions. Prior review of basic genetics and molecular biology is strongly recommended.
Prerequisites: NEUROSCI 202-0 and NEUROSCI 206-0; or NEUROSCI 311-0 and NEUROSCI 206-0; or BIOL_SCI 302-0.
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NEUROSCI 365-0 Neurobiology of Prediction (1 Unit)
This course examines neurophysiological circuit mechanisms that allow prediction to emerge in brains of (mostly) non-human animals. Topics include probability and variance, anticipation of aversive and rewarding stimuli, temporal and spatial prediction, and how cellular-level studies inform complex questions of human prediction.
Prerequisite: NEUROSCI 202-0 or NEUROSCI 311-0 or BIOL_SCI 302-0.

NEUROSCI 366-0 Brain Function Through the Lens of Computation (1 Unit)
This course introduces the basic building blocks of neural computation and their relevance for brain function. It begins with an overview of key principles related to neural network dynamics and neural coding. The course then develops these principles by illustrating how computational neuroscientists have used them to model specific sensory, motor, and cognitive functions of the brain.
Prerequisite: MATH 220-2 or equivalent.
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NEUROSCI 370-0 Genetic and Circuit Analysis of Motivated Behavior (1 Unit)
Animals are driven to engage in behaviors that fulfill essential needs for survival, such as eating, drinking, reproduction, and social interaction. This course focuses on the neurobiology of eating through lectures, scientific article discussions, and oral presentations.
Prerequisites: NEUROSCI 202-0 and NEUROSCI 206-0; or NEUROSCI 311-0 and NEUROSCI 206-0; or BIOL_SCI 302-0.

NEUROSCI 371-0 Microbiota-Gut-Brain Axis (1 Unit) Growing evidence has revealed the interaction between gut microbes, the immune system, and the nervous system. This communication could change the physiology of the brain and in turn moderate behaviors, neural development, and neurological diseases. This course will introduce key topics related to the microbiota-gut-brain axis. Prerequisites: NEUROSCI 202-0 or NEUROSCI 206-0 or BIOL_SCI 302-0. *Natural Sciences Distro Area Natural Sciences Foundational Discipline*

NEUROSCI 377-0 Neurobiology of Sensation and Perception (1 Unit)
Analysis of the key concepts underlying the neurobiological mechanisms of vision, hearing, taste, smell, touch, and pain. Neural pathways leading to perception and processing of stimuli will also be discussed.
Prerequisite: NEUROSCI 202-0 or NEUROSCI 311-0 or BIOL_SCI 302-0.
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NEUROSCI 390-0 Topics in Neuroscience (1 Unit) Special Topics in Neuroscience. Topics to be announced. Prerequisites vary. May be repeated for credit with different topic. May be used to fulfill a Neuroscience Group B elective or serve as a Biology Allied Field course.

NEUROSCI 398-0 Senior Thesis Seminar (1 Unit) Instruction in writing a scientific thesis, discussion of student projects, instructor and peer feedback on thesis drafts, and continued independent research. Required of seniors pursuing departmental honors, with approval of the director of undergraduate studies.Prerequisites: Students must be a neuroscience major and have departmental consent to take the course. *Advanced Expression*

NEUROSCI 399-0 Independent Study in Neuroscience (1 Unit)
Supervised laboratory or methods research with a faculty member. Research must be related to Neuroscience. Prerequisite: The research must be neuroscience based and only neuroscience majors may take this course.