

# NEUROSCIENCE (NBIO)

## Additional Resources

- Catalog Course Search (<https://catalog.unc.edu/course-search/>)
- Course Numbering Guide (<https://catalog.unc.edu/courses/course-numbering/>)
- Scheduled Classes (<https://reports.unc.edu/class-search/>)
- Historical Course Record ([https://reports.unc.edu/historical\\_course\\_record/](https://reports.unc.edu/historical_course_record/))

## Courses

### NBIO 411. Neurobiology Laboratory Apprenticeship. 1-21 Credits.

#### Rules & Requirements

**Grading Status:** Letter grade.

### NBIO 412. Neurobiology Laboratory Apprenticeship. 1-21 Credits.

#### Rules & Requirements

**Grading Status:** Letter grade.

### NBIO 450. Tutorial in Neurobiology. 3 Credits.

#### Rules & Requirements

**Grading Status:** Letter grade.

### NBIO 701A. Brain & Behavior I. 3 Credits.

Graduate standing required. A survey of psychological and biological approaches to the study of sensory and perceptual information processing, with an emphasis on touch and pain.

#### Rules & Requirements

**Grading Status:** Letter grade.

**Same as:** PSYC 701.

### NBIO 702A. Brain & Behavior II. 3 Credits.

A survey of psychological and biological approaches to the study of basic learning and higher integrative processing.

#### Rules & Requirements

**Grading Status:** Letter grade.

**Same as:** PSYC 702.

### NBIO 703. Advanced Biological Psychology: Central Nervous System. 3 Credits.

Each fall one special topic will be covered in depth (e.g., neural bases of memory storage, homeostasis, and perception). Format includes lectures and seminar meetings with student presentations.

#### Rules & Requirements

**Requisites:** Prerequisite, PSYC 402.

**Grading Status:** Letter grade.

**Same as:** PSYC 703.

### NBIO 704. Applications of Experimental Psychology to Health Research. 3 Credits.

This course provides a critical analysis of interdisciplinary research within experimental psychology, including such topics as psychopharmacology, psychoneuroimmunology, psychophysiology, and animal models of brain/behavior disorders.

#### Rules & Requirements

**Grading Status:** Letter grade.

**Same as:** PSYC 704.

### NBIO 705. Behavioral Pharmacology. 3 Credits.

Basic principles of pharmacology and behavior analysis are considered in relation to drugs that affect the central nervous system.

#### Rules & Requirements

**Requisites:** Prerequisite, PSYC 404; permission of the instructor for students lacking the prerequisite.

**Grading Status:** Letter grade.

**Same as:** PSYC 705, PHCO 705.

### NBIO 708. Research Design and Statistics in Neuroscience. 3 Credits.

Limited to graduate students in psychology, neuroscience, and neurobiology. Experimental design, hypothesis testing, power analyses, ANOVAs, regression, correlations. Hands on data analysis with you being able to use your own data sets. Analyses will be conducted with SPSS and Prism. Permission of the instructor.

#### Rules & Requirements

**Repeat Rules:** May be repeated for credit.

**Grading Status:** Letter grade.

**Same as:** PSYC 708.

### NBIO 710. Advanced Light Microscopy. 3 Credits.

An intensive and comprehensive hands-on laboratory-oriented course in light microscopy for researchers in biology, medicine, and materials science. This course will focus on advanced quantitative fluorescence microscopy techniques used for imaging a range of biological specimens, from whole organisms, to tissues, to cells, and to single molecules. This course emphasizes the quantitative issues that are critical to the proper interpretation of images obtained with light microscopes.

#### Rules & Requirements

**Repeat Rules:** May be repeated for credit. 6 total credits. 1 total completions.

**Grading Status:** Letter grade.

**Same as:** CBPH 710.

### NBIO 721. Directed Studies in Oral Biology. 1 Credits.

Topics include extracellular matrices, immunology, inflammation, neurobiology, and pain management.

#### Rules & Requirements

**Grading Status:** Letter grade.

**Same as:** OCBM 723.

### NBIO 722. Cellular and Molecular Neurobiology. 6 Credits.

Introduces topics including brain cell biology, molecular biology applied to neurons, membrane potentials and imaging methods. The second block introduces such topics as resistance, capacitance, passive membranes, classes of ion channels, potassium and calcium channels, and action potential initiation. Final blocks, focus on neurotransmitter release and signaling through distinct receptor subclasses. Topics include G-protein coupled receptors and associated signaling, receptor binding/ligand theory, ionotropic and metabotropic glutamate and GABA receptors, receptor trafficking and localization. Permission of the department.

#### Rules & Requirements

**Grading Status:** Letter grade.

**NBIO 722A. Cellular and Molecular Neurobiology: Introduction and Electrical Signaling. 2 Credits.**

Permission of the department. This course explores the experimental and theoretical function of the nervous system. Typically, the first hour is fundamental material presentation and the second hour may be a presentation led by the students. Topics covered include: cellular diversity in the CNS, gross brain anatomy, human and rodent brain imaging, neuromolecular genetics, behavioral methods, membrane potentials/resistance/capacitance, ion channel structure, electrophysiology and propagation of electrical signals in neurons. Basic undergraduate biology, chemistry, physics and intro calculus is assumed.

**Rules & Requirements**

**Grading Status:** Letter grade.

**Same as:** BIOC 722A, PHCO 722A.

**NBIO 722B. Cellular and Molecular Neurobiology: Postsynaptic Mechanisms-Receptors. 2 Credits.**

Permission of the department. Consideration of membrane receptor molecules activated by neurotransmitters in the nervous system with emphasis on ligand binding behavior and molecular and functional properties of different classes of receptors. Course meets for four weeks with six lecture hours per week.

**Rules & Requirements**

**Grading Status:** Letter grade.

**Same as:** BIOC 722B, PHCO 722B.

**NBIO 723. Cellular and Molecular Neurobiology. 6 Credits.**

Block one covers neural stem cells, glial development, neural cell death and neurotrophin. The second block introduces the sensory pathways of vision, audition, taste, olfaction, pain, and touch, and the motor pathways of the spinal cord, basal ganglia, cerebellum, and motor cortex. Includes sensory information processing, motor execution, peripheral and central mechanisms of pain. Final block covers CNS imaging, regeneration, and such diseases as Alzheimer's, ALS, Parkinson's, epilepsy, addiction, autism, and schizophrenia. Permission of the department required.

**Rules & Requirements**

**Grading Status:** Letter grade.

**NBIO 724. Developmental Neurobiology. 2 Credits.**

A survey of nervous system development emphasizing detailed analysis of selected research topics such as neuronal induction, neural crest development, neuronal differentiation, synapse formation, neurotrophic factors, glial development, and the effects of experience.

**Rules & Requirements**

**Requisites:** Prerequisite, NBIO 722; Permission of the instructor for students lacking the prerequisite.

**Grading Status:** Letter grade.

**NBIO 725. Experimental Neurophysiology. 3 Credits.**

Permission of the instructor. Six or more laboratory hours a week.

**Rules & Requirements**

**Grading Status:** Letter grade.

**NBIO 727. Translational Seminar in Cognitive and Clinical Neuroscience. 2 Credits.**

Introduces new neuroimaging techniques and their application to the study of neural correlates of cognitive and behavioral impairments in brain disorders. Reviews the theories and research methodologies that investigate how brain functions support and give rise to mental operations such as attention, memory, emotions, social cognition in the healthy brain.

**Rules & Requirements**

**Repeat Rules:** May be repeated for credit.

**Grading Status:** Letter grade.

**NBIO 728. Diseases of the Nervous System. 2 Credits.**

Explores the basic neurobiology and the clinical aspects of a range of diseases of the nervous system, including ALS, Alzheimer's, autism, schizophrenia, multiple sclerosis, deafness, epilepsy, pain, brain tumors, stroke, Parkinson's, and other neurodegenerative diseases.

**Rules & Requirements**

**Requisites:** Prerequisites, NBIO 201, or 722 and 223.

**Grading Status:** Letter grade.

**NBIO 729. Sensory Neural Information Processing and Representation. 3 Credits.**

Additional required preparation, one year of calculus, familiarity with MATLAB or Python, or permission of the instructor. A discussion/reading seminar covering the fundamentals of nervous system information processing and integration, with examples from sensory systems.

**Rules & Requirements**

**Requisites:** Prerequisites, NBIO 722 and 733.

**Grading Status:** Letter grade.

**NBIO 731. Microscopy: Principles & Applications. 2 Credits.**

This course aims to provide the knowledge one may need to understand the reach of microscopy imaging techniques, to be able to choose the right imaging modality, label the sample, carry out the experiment, analyze data, troubleshoot any pitfalls that may occur, and put together a custom optical setup.

**Rules & Requirements**

**Grading Status:** Letter grade.

**NBIO 732. Biological Concepts. 1.5 Credits.**

Overview of structures and biological determinants of conditions and diseases of the oral cavity. Both growth and development and pathophysiology will be introduced in the context of three areas of oral biology: biology of extracellular matrices, host-pathogens interactions, and orofacial neurobiology.

**Rules & Requirements**

**Grading Status:** Letter grade.

**Same as:** OCBM 732, PHCO 747.

**NBIO 733. Neurocircuits and Behavior Journal Club. 1 Credits.**

This is journal club course will meet once per week for 90 minutes to discuss new research papers focused on delineating how neurocircuits function to orchestrate various behavioral states. Papers for discussion will be chosen by the instructor and students, and students will rotate in leading discussions.

**Rules & Requirements**

**Requisites:** Prerequisites, NBIO 722 and 723.

**Grading Status:** Letter grade.

**NBIO 735. Seminar in Chemical Neurobiology. 2 Credits.**

Required preparation, two semesters of biochemistry.

**Rules & Requirements**

**Grading Status:** Letter grade.

**NBIO 750. Neuroanalytics: Introduction to Big Data Science for Neuroscientists. 4 Credits.**

The purpose of this course is to provide both practical and theoretical training in advanced data analysis approaches commonly used in neuroscience research. Making biological insights into complex neuroscience data requires familiarity with computer programming, distributed computing, visualization, and statistics. This course aims to provide an introduction to these analysis techniques to make the aspiring neuroscientist comfortable with data science.

**Rules & Requirements**

**Requisites:** Prerequisites, NBIO 722 and 723.

**Grading Status:** Letter grade.

**NBIO 751. Neurodevelopmental Basis of Brain Disorders. 2 Credits.**

The basic principles guiding in the formation and maintenance of human nervous system and how do distinct genetic/ epigenetic disruptions during development cause different types of human neurodevelopmental disorders. The intent of this course is to present latest advances in developmental neuroscience in the context of this theme. Topics covered IMIII include neural patterning, neurogenesis, neural cell fate specification, neuronal migration, axon/dendritic growth and connectivity.

**Rules & Requirements**

**Grading Status:** Letter grade.

**NBIO 800. Gene-Brain-Behavior Interactions in Neurodevelopmental Disorders: Perspectives on Disease Mechanisms. 3 Credits.**

This seminar examines the topics of genetics, neuroanatomy, physiology, and behavioral development to provide a broad-based and integrated background to understand the etiology and potential mechanism underlying neurodevelopmental disorders.

**Rules & Requirements**

**Grading Status:** Letter grade.

**NBIO 801. Clinical Syndromes and Neurodevelopmental Disorders. 3 Credits.**

This seminar will review the epidemiology, pathogenesis, diagnosis and treatment of neurodevelopmental syndromes and disorders. Topics will range from single gene (e.g. fragile X syndrome and tuberous sclerosis) to complex genetic (e.g., autism, schizophrenia), to environmental disorders with varied phenotypes, pathogenetic mechanisms, and treatments.

**Rules & Requirements**

**Grading Status:** Letter grade.

**NBIO 850. Improving Presentation & Communication of Scientific Results. 2 Credits.**

Learning modern day techniques and approaches to convey scientific results effectively as a public speaker. Teaching how to implement the key aspects of effective presentation of scientific findings in public settings. Understanding the key components of an effective public talk including scientific content, body language, and voice. Learning how to captivate the target audience and yet still convey data driven scientific findings.

**Rules & Requirements**

**Repeat Rules:** May be repeated for credit.

**Grading Status:** Letter grade.

**Same as:** CBPH 705.

**NBIO 857. Seminar in Comparative Animal Behavior. 1-2 Credits.**

Permission of the instructor. Advanced seminar in comparative animal behavior. May be repeated for credit.

**Rules & Requirements**

**Repeat Rules:** May be repeated for credit; may be repeated in the same term for different topics.

**Grading Status:** Letter grade.

**Same as:** BIOL 857.

**NBIO 858. Seminar in Comparative Physiology. 1-2 Credits.**

Advanced seminar in comparative physiology.

**Rules & Requirements**

**Requisites:** Prerequisite, BIOL 451; permission of the instructor for students lacking the prerequisite.

**Repeat Rules:** May be repeated for credit; may be repeated in the same term for different topics.

**Grading Status:** Letter grade.

**Same as:** BIOL 858.

**NBIO 890. Special Topics in Neurobiology. 1-5 Credits.**

Special topics in neurobiology. Content will vary from semester to semester.

**Rules & Requirements**

**Grading Status:** Letter grade.

**NBIO 892. Special Topics in Physiology. 1-5 Credits.**

Permission of the instructor. Individually arranged in-depth programs of selected topics such as membrane function, transport physiology, renal physiology, etc.

**Rules & Requirements**

**Grading Status:** Letter grade.

**NBIO 893. Neuroscience Seminar Series. 1 Credits.**

Diverse but current topics in all aspects of neuroscience. Relates new techniques and current research of notables in the field of neuroscience. Content focuses on presentations by invited, non-UNC faculty, UNC faculty and mini-series presentations from current Neuroscience students. Topics vary from week to week.

**Rules & Requirements**

**Grading Status:** Letter grade.

**NBIO 951. Research in Neurobiology. 3-12 Credits.**

Permission of the department. Research in various aspects of neurobiology. Six to 24 hours a week.

**Rules & Requirements**

**Grading Status:** Letter grade.

**Same as:** BIOL 951, PHCO 951.

**NBIO 993. Master's Research and Thesis. 3 Credits.**

Course is designed to certify that the students have achieved a high level of knowledge competence in clinical and basic neurosciences, without the rigorous research experience required of a Ph.D.

**Rules & Requirements**

**Repeat Rules:** May be repeated for credit.

**NBIO 994. Doctoral Research and Dissertation. 3 Credits.**

**Rules & Requirements**

**Repeat Rules:** May be repeated for credit.