

# PHARMACOLOGY (PHCO)

## 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

### PHCO 667. Macromolecular Crystallographic Methods. 2 Credits.

A combined lecture/laboratory workshop for serious students of protein crystallography. Course intended primarily for graduate students.

#### Rules & Requirements

**Requisites:** Prerequisite, permission of the instructor.

**Grading Status:** Letter grade.

**Same as:** BIOC 667.

### PHCO 669. Macromolecular Crystallographic Methods II. 2 Credits.

BIOC 667 is recommended for crystallography students. Permission of the instructor for students lacking the prerequisite. A combined lecture/laboratory workshop for serious students of protein crystallography or cryo-electron microscopy, addressing experimental model building, refinement, and analysis. Course intended primarily for graduate students.

#### Rules & Requirements

**Requisites:** Prerequisite, Prerequisite, BIOC 666 or BIOC 675.

**Grading Status:** Letter grade.

**Same as:** BIOC 669.

### PHCO 701. Introduction to Molecular Pharmacology. 3 Credits.

Permission of the instructor. A first-year pharmacology course outlining the basics of molecular pharmacology, including molecular biology, drug and receptor interactions, receptors and ion channels, regulation of second messengers, and drug metabolism. Three lecture hours a week.

#### Rules & Requirements

**Grading Status:** Letter grade.

### PHCO 702. Principles of Pharmacology and Physiology. 3 Credits.

Introduces students to the major areas of pharmacology and physiology and serves as a basis for more advanced courses. Three lecture hours a week.

#### Rules & Requirements

**Requisites:** Prerequisite, CHEM 430; permission of the instructor for students lacking the prerequisite.

**Grading Status:** Letter grade.

**Same as:** TOXC 702.

### PHCO 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, NBIO 705.

### PHCO 707. Advanced Toxicology. 3 Credits.

Cellular and physiological basis of toxicity of environmental chemicals, with emphasis on inhalation toxicology, developmental toxicology, immunotoxicology, radiation toxicology, renal toxicology, and neurotoxicology. Three lecture hours per week.

#### Rules & Requirements

**Requisites:** Prerequisite, PHCO 702; permission of the instructor for students lacking the prerequisite.

**Grading Status:** Letter grade.

**Same as:** TOXC 707, ENVR 707.

### PHCO 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:** NBIO 722A, BIOC 722A.

### PHCO 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:** NBIO 722B, BIOC 722B.

### PHCO 725. Signal Transduction. 2 Credits.

Seminar/discussion course on molecular aspects of the receptors, G-proteins, effector proteins, kinases, and phosphatases that mediate hormone, neurotransmitter, growth factor, and sensory signaling.

#### Rules & Requirements

**Grading Status:** Letter grade.

**Same as:** BIOC 725.

### PHCO 726. Adhesion Receptors and Signaling in Cancer and CV Disease. 2 Credits.

Examines the growing number of families of cell adhesion receptors and their role in biological processes including signal transduction, control of gene expression, hemostasis, cancer, neuronal development, immunobiology, and embryologic development.

#### Rules & Requirements

**Grading Status:** Letter grade.

### PHCO 727. Structure and Function of Ion Channels. 2 Credits.

Seminar/discussion course on the physiology, pharmacology, biochemistry, and molecular biology of ion channel proteins.

#### Rules & Requirements

**Grading Status:** Letter grade.

**PHCO 728. Neuropharmacology of Alcohol and Substance Use. 3 Credits.**

A lecture/discussion course on the biological bases of alcohol and substance abuse.

**Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 729. Gene Therapy: Medicine for the 21st Century. 2 Credits.**

A seminar/discussion course on recent advances in targeted gene delivery and gene therapy.

**Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 730. Seminar in Recent Advances in Pharmacology. 1 Credits.**

Students meet as a group with faculty members to develop skills in critical reading and to summarize and discuss selected aspects of current pharmacological literature. Two hours a week. Fall and spring.

**Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 732. Grant Writing. 2 Credits.**

A discussion course covering the elements of successful grant proposals and scientific ethics.

**Rules & Requirements**

**Requisites:** Prerequisite, PHCO 701; Permission of the instructor for students lacking the prerequisite.

**Grading Status:** Letter grade.

**PHCO 733. Drug Discovery and Development. 2 Credits.**

A seminar/discussion course on the research, development, and regulatory processes involved in bringing new drugs to clinical use.

**Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 734. Pain and Analgesia. 2 Credits.**

A lecture/discussion course on pain transmission and pain measurement. The neuropharmacological basis of pain modulation will be discussed.

**Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 735. Discovery Biology and Pharmacogenomics. 2 Credits.**

Lecture/discussion course covering a variety of aspects of new biological and computational technologies. The course is predominantly in a lecture format with computer-based and literature assignments.

**Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 736. Protein Kinases as Targets for Novel Pharmacological Inhibitors. 2 Credits.**

A seminar/discussion course to evaluate the use of small molecule inhibitors of protein kinases from a structural and signal transduction perspective.

**Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 737. Target-Based Drug Discovery and Cancer Treatment. 2 Credits.**

A lecture/discussion course that emphasizes preclinical and clinical studies for the development of anti-cancer drugs that target signal transduction. Topics include: target identification and validation, drug discovery, the process of government approval for clinical trials, design of clinical trials, and new genetic-based technologies to foster drug development.

**Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 739. Reprogramming of Somatic and Stem Cells and Its Applications in Pharmacology. 2 Credits.**

The objective of this new elective is to provide graduate students with an overview of stem cell biology with a unique emphasis on the applications of stem cells in pharmacology, particularly in areas of cancer and tissue regeneration.

**Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 740. Contemporary Topics in Cell Signaling: Phosphorylation Control. 1 Credits.**

Required preparation, coursework in biochemistry, pharmacology and/or cell & molecular biology. Permission of the instructor. This graduate-level course is an in-depth analysis of how protein kinases and protein phosphorylation regulates key aspects of cell signaling. This class is one of the "Contemporary Topics in Cell Signaling" modules.

**Rules & Requirements**

**Grading Status:** Letter grade.

**Same as:** BIOC 740.

**PHCO 741. Contemporary Topics in Cell Signaling: GTPases. 1 Credits.**

Required preparation, coursework in biochemistry, pharmacology, and/or cell & molecular biology. Permission of the instructor. This graduate-level course conveys principles of signal transduction controlled by GTPases and emphasizes in-depth discussion of current literature and unanswered questions. This class is one of the "Contemporary Topics in Cell Signaling" modules.

**Rules & Requirements**

**Grading Status:** Letter grade.

**Same as:** BIOC 741.

**PHCO 742. Contemporary Topics in Cell Signaling: Cell Cycle Control. 1 Credits.**

Permission of the instructor. Required preparation, coursework in biochemistry and/or cell & molecular biology. This graduate-level course conveys principles of eukaryotic cell proliferation control emphasizing in-depth discussion of current literature and unanswered questions. This class is one of the Contemporary Topics in Cell Signaling modules.

**Rules & Requirements**

**Grading Status:** Letter grade.

**Same as:** BIOC 742, BIOC 742.

**PHCO 743. Contemporary Topics in Cell Signaling: Signaling Networks. 1 Credits.**

Acquire the scientific vocabulary of the signaling network field. Master key concepts from mathematical characterization of signaling circuits. Develop and apply critical analysis skills.

**Rules & Requirements**

**Grading Status:** Letter grade.

**Same as:** BIOC 743.

**PHCO 744. Topics on Stem Cells and Development. 2 Credits.**

Required preparation, coursework in genetics, cell biology, and molecular biology. Permission of the instructor. Course addresses key issues in developmental biology focused on the role of stem cells and emphasizes in-depth discussion of current literature and unanswered questions. One of the Contemporary Topics in Cell Signaling modules.

**Rules & Requirements**

**Grading Status:** Letter grade.

**Same as:** BIOC 744.

**PHCO 745. Intercellular Signaling in Development and Disease. 1 Credits.**

This graduate-level course concentrates on up-to-date views of intercellular signal processing, with emphasis on signal transduction mechanisms as they relate to cellular/physiological responses in both normal development and disease. Signaling mechanisms that will be discussed include autocrine, paracrine, juxtacrine signaling and cell-matrix interactions.

**Rules & Requirements**

**Grading Status:** Letter grade.

**Same as:** BIOC 745.

**PHCO 746. Introduction to Computer Vision Tools for Modern Microscopy. 1 Credits.**

This course will introduce computer vision methods for cell biology. Each topic will be motivated with an explanation of a computational challenge, followed by a discussion of available techniques to address the need and practical examples for how to apply the techniques.

**Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 747. 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, NBIO 732.

**PHCO 748. Translational Pain Medicine. 1.5 Credits.**

This is a clinician-taught course that advances students' understanding of chronic pain (e.g., head/face pain, pelvic pain, back pain, cancer pain, surgical pain) in both the classroom and the clinic.

**Rules & Requirements**

**Requisites:** Prerequisite, OBIO 732; Permission of the instructor for students lacking the prerequisite.

**Grading Status:** Letter grade.

**Same as:** OCBM 733.

**PHCO 749. Practical RNA-Seq. 2 Credits.**

This course is designed to familiarize students with everything needed to run an RNA-Seq experiment. There will be minimal emphasis on theory and heavy focus on practical aspects. There are no formal prerequisites required for this course and no prior experience with UNIX or the command line interface is expected.

**Rules & Requirements**

**Grading Status:** Letter grade.

**Same as:** GNET 749.

**PHCO 750. Proteomics Methods and Applications. 1 Credits.**

This course will familiarize graduate students with the fundamental concepts of mass spectrometry-based proteomics with emphasis on its applications (expression proteomics, post-translational modification identification, and interactomics) and practical aspects of these applications, such as experimental design, sample preparation and data interpretation. This course is intended for 2nd year students and above who currently use or plan to use proteomics in their research.

**Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 767. Macromolecular Crystallographic Methods. 2 Credits.**

A combined lecture/laboratory workshop for serious students of protein crystallography. Course intended primarily for graduate students.

**Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 900. Special Pharmacology Research. 3-6 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 901. Research in Pharmacology. 1-15 Credits.**

Permission of the department.

**Rules & Requirements**

**Grading Status:** Letter grade.

**PHCO 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:** NBIO 951, BIOL 951.

**PHCO 989. Special Pharmacology Research. 3-6 Credits.****Rules & Requirements**

**Grading Status:** Letter grade.

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

Permission of the department.

**Rules & Requirements**

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

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

Permission of the department.

**Rules & Requirements**

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