

PHARMACEUTICAL SCIENCES (PHRS)

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/)

Courses

PHRS 175. Principles of Pharmacy and Pharmaceutical Sciences. 1 Credits.

This course introduces the profession of pharmacy and the pharmaceutical sciences. An examination of the fundamental principles underlying both fields promotes an understanding that includes historical developments, issues and controversies, contemporary challenges and opportunities for innovation, and career opportunities. Importantly, students explore strategies for pharmaceutical research and care in the contexts of FDA-regulated drug development and the roles of pharmaceuticals in healthcare.

Rules & Requirements

Requisites: Prerequisite, CHEM 261; Pre- or corequisites, CHEM 262 and MATH 231.

Grading Status: Letter grade.

PHRS 395. Research in Pharmaceutical Sciences. 3 Credits.

Permission must be granted by the course instructor prior to enrollment. This course is a supervised experiential research experience in a pharmaceutical sciences laboratory. Students engage in a mentored, in-depth, scholarly project wherein they frame an answerable question with a faculty course instructor, generate and interpret relevant data, and communicate their findings in written form.

Rules & Requirements

Grading Status: Letter grade.

PHRS 500. Innovations and Transformations in Pharmaceutical Sciences. 4 Credits.

Students will learn about and develop skills in topics related to the drug development pipeline (from discover, delivery, clinical pharmacology, and outcomes), pharmacy practice, and professional development. Programming consists of classroom sessions, guest speakers, panels, simulations, and site visits to hospitals, community pharmacies, and different pharmaceutical industries. Classroom sessions will be led by graduate students, post-doctoral fellows, and faculty. The classroom experience will be active learning to immerse students in scientific discourse. Restricted to learners participating in the UNC Eshelman School of Pharmacy ITPS Program.

Rules & Requirements

Grading Status: Letter grade.

PHRS 501. Fundamentals of Regulatory Affairs. 2 Credits.

This foundational pharmaceutical science course will provide an overview of regulatory affairs with a focus on global pharmaceutical product development. Students will learn about medical product regulation in the United States and key international markets. Students will also learn about the process for obtaining and maintaining marketing approval along with tools and approaches used by regulatory professionals. This didactic course will be taught asynchronously but will include regular touch points.

Rules & Requirements

Requisites: Prerequisite, CHEM 262.

Grading Status: Letter grade.

PHRS 502. Making Medicines: Drug Discovery, Development, and Approval. 1 Credits.

This course introduces the pharmaceutical sciences as a scientific discipline by facilitating student exploration of how new drugs are developed from the initial concept to the patient. Students gain an understanding of each stage through self-paced, asynchronous interaction with online videos highlighting the fundamental processes and rigor drug manufacturers undertake to research, develop, and deliver new medicines to patients. In class, students will engage in case-based discussions with experienced drug development professionals.

Rules & Requirements

Requisites: Prerequisite, CHEM 261; Corequisites, CHEM 261L, CHEM 262 and MATH 231.

Grading Status: Letter grade.

PHRS 504. Biochemical Foundations of Chemical Biology. 3 Credits.

This course covers core biochemical and molecular biology techniques, concepts, and tools used to conduct research at the interface of chemistry and biology. Topics include enzymology, characterization of drug-target interactions, mechanisms-based inhibitor design, assay design and development, targeting kinases and GPCRs, biopharmaceuticals, gene therapy, nucleic-acid binding agents, information-based drugs, chemical tools to study epigenetics, harnessing biosynthetic pathways for chemical diversity, and other recent advances and techniques in drug discovery.

Rules & Requirements

Requisites: Prerequisites, CHEM 241, CHEM 262 or 262H, BIOC 107, and BIOL 202 or 220 or 240.

Grading Status: Letter grade.

PHRS 507. Molecular Foundations of Chemical Biology: Organic and Medicinal Chemistry. 3 Credits.

Organic chemistry, broadly writ (i.e., not just synthesis), underlies nearly every endeavor in medicinal chemistry (the search for new drugs) and chemical biology (the use of chemical tools to understand biology). This course provides a review of important concepts in organic chemistry as they apply to biological research. Topics include a review of intermolecular interactions as they apply to biological structures and function, a discussion of how small molecules interact with their targets.

Rules & Requirements

Requisites: Prerequisite, CHEM 262.

Grading Status: Letter grade.

PHRS 515. Evaluation Research and Project Design. 3 Credits.

This course will include formal instruction on evaluation research, study design, and data analyses that would be encountered in a health system pharmacy administration workplace. This course is designed to provide a broad survey of critical evaluation components, and students are encouraged to explore any topic in more depth, as needed or desired.

Rules & Requirements

Grading Status: Letter grade.

PHRS 516. Foundations in Implementation Science: Examples in Precision Health and Society. 1.5 Credits.

This course will cover the fundamentals of implementation science using examples in precision health (e.g., targeted therapies, pharmacogenomics, and tailored treatment plans). More specifically, we will discuss frameworks, strategies, study designs, and outcomes related to implementation science using examples related to the implementation of precision health in research and practice. We will apply these learnings to implementation challenges, so that future pharmacists and researchers alike can consider the application.

Rules & Requirements

Requisites: Prerequisites, SOCI 172 and SPHG 101, or permission of instructor.

Grading Status: Letter grade.

PHRS 517. Data Science in Pharmacy. 1 Credits.

This data science elective course is intended to provide students with baseline knowledge of core competencies in data science and its applications across the health sciences landscape and prepares students to become successful in their profession. Pharmacists will encounter data science in different contexts throughout their careers. ASHP describes such "informatics" projects as including creation of clinical decision support; ensuring accuracy of medication order intent; and guiding clinicians to appropriate medication use.

Rules & Requirements

Grading Status: Letter grade.

PHRS 538. Nanomedicine. 3 Credits.

Discuss basic physicochemical and transport properties of the nano drug carriers with emphasis in macromolecules, diagnosis, and therapeutics.

Rules & Requirements

Grading Status: Letter grade.

PHRS 564. Advances in Drug Delivery. 3 Credits.

Students will learn the basic concept of biological barriers for drug delivery, various formulation strategies to overcome barriers, and concepts relevant to specific routes of delivery.

Rules & Requirements

Grading Status: Letter grade.

PHRS 596. Pharmaceutical Sciences Seminar in Chemical Biology and Medicinal Chemistry. 1 Credits.

This course, which offered in both the Fall and Spring semesters, provides a deep look at contemporary research in Chemical Biology and Medicinal Chemistry as a pharmaceutical sciences discipline. The class format consists of seminar presentations by experts in the field, including invited outside scientists, faculty members, or doctoral candidates. Students are expected to actively engage in seminar activities and participate in impromptu discussions.

Rules & Requirements

Grading Status: Letter grade.

PHRS 597. Pharmaceutical Sciences Seminar in Pharmacotherapy and Experimental Therapeutics. 1 Credits.

This course, which offered in both the Fall and Spring semesters, provides a deep look at contemporary research in Pharmacotherapy and Experimental Therapeutics as a pharmaceutical sciences discipline. The class format consists of seminar presentations by experts in the field, including invited outside scientists, faculty members, or doctoral candidates. Students are expected to actively engage in seminar activities and participate in impromptu discussions.

Rules & Requirements

Grading Status: Letter grade.

PHRS 598. Pharmaceutical Sciences Seminar in Pharmacoengineering and Molecular Pharmaceutics. 1 Credits.

This course, which offered in both the Fall and Spring semesters, provides a deep look at contemporary research in Pharmacoengineering and Molecular Pharmaceutics as a pharmaceutical sciences discipline. The class format consists of seminar presentations by experts in the field, including invited outside scientists, faculty members, or doctoral candidates. Students are expected to actively engage in seminar activities and participate in impromptu discussions.

Rules & Requirements

Grading Status: Letter grade.

PHRS 599. Pharmaceutical Sciences Seminar in Pharmaceutical Outcomes and Policy. 1 Credits.

This course, which offered in both the Fall and Spring semesters, provides a deep look at contemporary research in Pharmaceutical Outcomes and Policy as a pharmaceutical sciences discipline. The class format consists of seminar presentations by experts in the field, including invited outside scientists, faculty members, or doctoral candidates. Students are expected to actively engage in seminar activities and participate in impromptu discussions.

Rules & Requirements

Grading Status: Letter grade.

PHRS 700. Making Medicines. 0.5 Credits.

This foundational pharmaceutical science course will provide an overview of the pharmaceutical product development process including challenges and issues associated with each phase. Students will learn how pharmaceutical products are identified for development and key steps in obtaining and maintaining market approval. Students will also learn about business aspects that drive the development strategy. This graduate-level didactic course will be taught asynchronously.

Rules & Requirements

Grading Status: Letter grade.

PHRS 701. Fundamentals of Regulatory Affairs. 2 Credits.

This foundational regulatory science course will provide an overview of regulatory affairs with a focus on global pharmaceutical product development. Students will learn about pharmaceutical product regulation in the US and other key international markets. Students will also learn about the process for obtaining and maintaining marketing approval along with tools and approaches used by regulatory professionals. This graduate-level didactic course will be taught asynchronously but will include regular touch points.

Rules & Requirements

Grading Status: Letter grade.

PHRS 702. Preclinical Development. 2 Credits.

This foundational pharmaceutical science course will cover preclinical aspects of pharmaceutical product development and how they contribute to the regulatory approval process. Students will learn about the processes of drug discovery, lead optimization, and compound formulation, as well as in vitro and in vivo approaches to assess drug metabolism and pharmacokinetics, pharmacology, and toxicology. This graduate-level didactic course will be taught asynchronously but will include regular touch points with course instructors and other students.

Rules & Requirements

Grading Status: Letter grade.

PHRS 703. Chemistry, Manufacturing, and Controls. 2 Credits.

This foundational pharmaceutical science course will provide an overview of chemistry, manufacturing, and controls in pharmaceutical product development and how they differ by product type. Students will learn about the processes of assay development, manufacturing, and quality control for small molecules, biologics, and gene and cell therapies. Students will also learn about regulatory submissions and inspections. This graduate-level didactic course will be taught asynchronously but will include regular touch points.

Rules & Requirements

Grading Status: Letter grade.

PHRS 704. Clinical Development. 2 Credits.

This foundational pharmaceutical science course will cover clinical aspects of pharmaceutical product development and contributions to the regulatory process. Students will study the phases of clinical development and considerations for trial design, conduct, and evaluation of data. Students will also learn about bioethics and differences in clinical research in the US and key international markets. This graduate-level didactic course will be taught asynchronously but will include regular touch points with course instructors and other students.

Rules & Requirements

Grading Status: Letter grade.

PHRS 705. Postmarketing Topics. 2 Credits.

This foundational pharmaceutical science course will cover postmarketing aspects of pharmaceutical product development and how they contribute to maintaining regulatory approval. Students will learn about activities that help to further evaluate and exploit the full potential of a marketed pharmaceutical product including supply chain, sales and marketing, pharmacovigilance, risk management, and postmarketing research. This graduate-level didactic course will be taught asynchronously but will include regular touch points with course instructors and other students.

Rules & Requirements

Requisites: Prerequisites, PHRS 701, 702, 703, and 704.

Grading Status: Letter grade.

PHRS 710. Biostatistics. 1 Credits.

This foundational pharmaceutical science course will teach basic statistical concepts used frequently during pharmaceutical product development. Students will learn the statistical terminology and approaches that are used to initiate a research investigation, plan a clinical trial, and analyze data. Students will also learn about the role of the statistician in pharmaceutical product development. This graduate-level didactic course will be taught asynchronously but will include regular touch points with course instructors and other students.

Rules & Requirements

Grading Status: Letter grade.

PHRS 711. Emerging Topics in Regulatory Science. 2 Credits.

This foundational pharmaceutical science course will provide an overview of regulatory science with focus on FDA regulatory science priorities related to innovation in pharmaceutical product development. Students will learn about current research aimed at modernizing toxicology, innovating clinical research and personalized medicine, improving manufacturing and quality, and strengthening social and behavioral science. This graduate-level didactic course will be taught asynchronously but will include regular touch points with course instructors and other students.

Rules & Requirements

Grading Status: Letter grade.

PHRS 712. Seminars in Chromatin and Epigenetics. 0.5 Credits.

Designed to expose students to the broad epigenetic research interests of our large epigenetics focused faculty and expose students to a broad range of epigenetics research techniques.

Rules & Requirements

Repeat Rules: May be repeated for credit. 1 total credits. 2 total completions.

Grading Status: Letter grade.

Same as: BIOC 703.

PHRS 801. Foundations for Cross-Disciplinary Training in the Pharmaceutical Sciences. 1-3 Credits.

This is a required course for first year pharmaceutical sciences graduate students. Students participate on cross-discipline teams to discuss topics in three foundational areas essential to their development as pharmaceutical scientists: research ethics which meets RCR training requirements; leading research articles within five areas of pharmaceutical sciences; and professional development.

Rules & Requirements

Grading Status: Letter grade.

PHRS 802. Drug Development and Professional Skills Development. 1 Credits.

Students will learn about and develop skills in topics related to pharmaceutical development and professional development. The Common Core is an interdisciplinary environment with students from each of the four Divisional PhD programs.

Rules & Requirements

Requisites: Prerequisite, First year graduate student in Pharmaceutical Sciences or instructor permission required.

Grading Status: Letter grade.

PHRS 810. Regulatory Communication. 2 Credits.

This advanced pharmaceutical science course will train students on strategic elements to consider when preparing for communications with regulators necessary to support and maintain pharmaceutical product marketing approval and advise on regulatory agency interactions. Students will learn how clarity and brevity should drive both presenting and summarizing of science and data considering the regulations. This graduate-level applied course will be taught synchronously and involve significant interaction with the course instructor and other students.

Rules & Requirements

Grading Status: Letter grade.

PHRS 811. Regulatory Strategy. 2 Credits.

This advanced pharmaceutical science course will train students to integrate strategic business needs, risk assessment, and risk management when developing a regulatory plan. Using case studies and team projects, students will learn to start with the end in mind, analyze critical product life cycle events, and leverage previous experience to successfully achieve regulatory goals. This graduate-level applied course will be taught synchronously and involve significant interaction with the course instructor other students.

Rules & Requirements

Requisites: Prerequisites, PHRS 701, 702, 703, and 704.

Grading Status: Letter grade.

PHRS 815. Foundations in Implementation Science: Examples in Precision Health and Society. 1.5 Credits.

The goals of implementation science and precision health are to figure out ways to get the right care to the right patients at the right time. Implementation science is defined as "the study of methods to promote the translation of evidence-based practices, interventions, and policies related to precision health into practice settings to improve patient and population health." This course will cover the fundamentals of implementation science using examples in precision health.

Rules & Requirements

Requisites: Prerequisite, PHCY 504.

Grading Status: Letter grade.

PHRS 890. Special Topics in Pharmaceutical Sciences. 1-3 Credits.

Topic determined by instructor and announced in advance.

Rules & Requirements

Repeat Rules: May be repeated for credit.

Grading Status: Letter grade.

PHRS 899. Seminar in Pharmaceutical Sciences. 1 Credits.

This course is required for all Pharmaceutical Sciences graduate students. Other students must obtain permission from the divisional course director. Class format consists of seminar presentations by students and/or faculty or invited speakers. Students are expected to actively engage in seminar activities and discussions.

Rules & Requirements

Repeat Rules: May be repeated for credit.

Grading Status: Letter grade.

PHRS 990. Practicum in Pharmaceutical Sciences. 1-9 Credits.

Enrollment in this variable credit course requires a signed agreement between the Chair of the student's academic division and a representative of the institutional sponsor providing the research practicum. Teaching/learning methods consist of a pharmaceutical sciences-based research training experience at the participating institution involving independent work and written and oral reports.

Rules & Requirements

Repeat Rules: May be repeated for credit.

Grading Status: Letter grade.

PHRS 991. Research in Pharmaceutical Sciences. 1-9 Credits.

This is a variable credit course required for all Pharmaceutical Sciences graduate students by their second semester. Teaching/learning methods consist of a pharmaceutical sciences-based mentored research training experience involving independent work and research reports that must be filed at the end of the semester.

Rules & Requirements

Repeat Rules: May be repeated for credit.

Grading Status: Letter grade.

PHRS 992. Master's (Non-Thesis). 3 Credits.

Students register for thesis substitute credits after successfully passing their comprehensive written examinations. A minimum of 3 credit hours of thesis substitute research and writing is required for Pharmaceutical Sciences graduate students.

Rules & Requirements

Requisites: Prerequisite, PHRS 991 or equivalent.

Repeat Rules: May be repeated for credit.

PHRS 993. Master's Research and Thesis. 3 Credits.

Students register for thesis credits after successfully passing their comprehensive written examination. A minimum of 3 credit hours of thesis research and writing is required for Pharmaceutical Sciences graduate students.

Rules & Requirements

Requisites: Prerequisite, PHRS 991 or equivalent.

Repeat Rules: May be repeated for credit.

PHRS 994. Doctoral Research and Dissertation. 3 Credits.

Students register for dissertation credits after successfully passing their qualifying preliminary and oral examinations. A minimum of 6 credit hours of dissertation research and writing is required for Pharmaceutical Sciences graduate students.

Rules & Requirements

Requisites: Prerequisite, PHRS 991 or equivalent.

Repeat Rules: May be repeated for credit.