**PHARMACEUTICAL SCIENCES (PHRS)**

**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 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. 1.5 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 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 720. Translational Research: Bench to Market. 1.5 Credits.**
This foundational course in translational science will provide an overview of how laboratory discoveries can be translated into developing marketed pharmaceutical products. Students will learn how to determine when a discovery is ready for translational research and what factors drive its success. Students will also learn about business aspects that drive 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 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 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.