PHARMACOLOGY (PHMCOL-M)

PHMCOL-M/PHM SCI 522 — PHARMACOLOGY II
3-4 credits.
Pharmacological actions of important drugs, including hematopoietic, thrombolytic, antihyperlipidemic, immunopharmacologic, anticancer, anti-inflammatory, diuretic, antianginal, and anti-arrhythmic agents, and agents used to treat congestive heart failure.
Requisites: PHM SCI 521
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Recall the names of different drugs, and be able to link these drug names to not only specific uses, but also to more general concepts about physiology, disease, and drug mechanism of action
Audience: Undergraduate
2. Describe and differentiate the pharmacology of drugs that act on organ systems, including the endocrine, gastrointestinal, cardiovascular, renal, hematopoietic, and immune systems
Audience: Undergraduate

PHMCOL-M/B ME/MED PHYS/PHYSICS/RADIOL 619 — MICROSCOPY OF LIFE
3 credits.
Survey of state of the art microscopic, cellular and molecular imaging techniques, beginning with subcellular microscopy and finishing with whole animal imaging.
Requisites: PHYSICS 104, 202, 208, or 248 or PHYSICS/MED PHYS 265
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

PHMCOL-M/ME/ONCOLOGY/PHM SCI/POP HLTH 625 — TOXICOLOGY I
3 credits.
Basic principles of toxicology and biochemical mechanisms of toxicity in mammalian species and man. Correlation between morphological and functional changes caused by toxicants in different organs of the body.
Requisites: (BIOCHEM 501 or 508) and (ANAT&PHY 335, 435, or (BIOC 485 and 486)) and PATH 404; or graduate/professional standing
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023
Learning Outcomes: 1. Discuss the physiology and pathology of toxicology, understanding the basic fundamentals of toxicology and toxic agents
Audience: Both Grad & Undergrad
2. Demonstrate metabolism and breakdown of toxicants using a given dataset
Audience: Both Grad & Undergrad
3. Recognize various experimental models to obtain scientific results
Audience: Both Grad & Undergrad
4. Implement knowledge to design experiments applicable to one’s own research
Audience: Both Grad & Undergrad
5. Critique an example of toxicology in media and develop a presentation of this example
Audience: Both Grad & Undergrad
6. Explore new areas to assist in career development via journal club
Audience: Graduate
PHMCOL-M/M&ENVTOX/PATH/PHM SCI/POP HLTH 626 –
TOXICOLOGY II
3 credits.
Survey of the basic methods and fundamental biochemical mechanisms of
toxicity. Toxicity in mammalian organ systems, techniques for evaluating
toxicity, as well as mechanisms of species specificity, and environmental
interactions (with toxicant examples) are presented.

Requisites: POP HLTH/M&ENVTOX/ONCOLOGY/PHM SCI/PHMCOL-M 625
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Explain and identify the effects of toxicants on
specific organs within the human body
Audience: Both Grad & Undergrad
2. Demonstrate metabolism and reactions of toxicants within organ
systems using a given dataset
Audience: Both Grad & Undergrad
3. Classify different means of risk assessment and the conceptual
rationale behind these methods
Audience: Both Grad & Undergrad
4. Implement knowledge to design experiments applicable to one’s own
research
Audience: Both Grad & Undergrad
5. Relate specific organ concepts with conceptual examples from
M&ENVTOX 625 to enhance scientific understanding
Audience: Undergraduate
6. Appraise concepts to research to identify future research concepts.
Audience: Graduate

PHMCOL-M 699 – INDEPENDENT STUDY
1-3 credits.
Directed study projects for juniors and seniors.

Requisites: Consent of instructor

Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2023
Learning Outcomes: 1. Apply concepts learned in coursework to real life
situations
Audience: Undergraduate
2. Read and effectively search scientific literature
Audience: Undergraduate
3. Develop critical, analytical, and independent thinking skills
Audience: Undergraduate

PHMCOL-M 715 – GRANT WRITING
1 credit.
Develop a predoctoral fellowship application based on the student’s
proposed thesis project. Receive input on ideas and writing, both from the
instructor and peers.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate
coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Write a cogent specific aims page for a grant
proposal.
Audience: Graduate
2. Summarize background information in a coherent and concise manner,
highlighting the significance of research being proposed.
Audience: Graduate
3. Outline methodologies to address a specific set of research questions.
Audience: Graduate
4. Read and critique grant proposals written by peers.
Audience: Graduate
5. Design experiments which are properly controlled and which use
appropriate statistical methods of data analysis.
Audience: Graduate
PHMCOL-M 739 – RIGOR, REPRODUCIBILITY AND BECOMING AN EFFECTIVE RESEARCHER
1 credit.

Focuses on two of the cornerstones of science advancement, which are rigor in designing and performing scientific research and the ability to reproduce biomedical research findings. Emphasizes the application of rigor that ensures robust and unbiased experimental design, methodology, analysis, interpretation, and reporting of results. Highlights topics of particular importance to first year graduate students, including the development of effective presentation skills, communication in a professional setting, and a strong mentor-mentee relationship.

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023
Learning Outcomes:
1. Select a well-controlled experimental design that is appropriate to answer a research question
Audience: Graduate
2. Consider all relevant biological variables to include in the experimental design
Audience: Graduate
3. Authenticate key biological and chemical resources used in experiments
Audience: Graduate
4. Perform statistical analyses appropriate for the experimental design
Audience: Graduate
5. Use transparency in reporting and publishing results, so that others may reproduce and extend the findings
Audience: Graduate
6. Develop skills to cope with the rigors of a graduate education in the pharmacological sciences
Audience: Graduate

PHMCOL-M 781 – MOLECULAR AND CELLULAR PRINCIPLES IN PHARMACOLOGY
4 credits.

Provides an in-depth introduction to the molecular and cellular principles of pharmacology. Emphasis is on the mechanisms of drug and small molecule action in cells, with a particular focus on downstream signaling pathways, second messenger systems, protein kinase cascades, and the regulation of gene transcription.

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes:
1. Recognize the fundamental principles of drug actions at their target sites (e.g. receptors, enzymes, etc)
Audience: Graduate
2. Understand the various mechanisms by which drugs can mediate their pharmacological effect
Audience: Graduate
3. Describe how drugs mimic or modify physiological function, including the various actions and clinical uses
Audience: Graduate
4. Describe the major classes of therapeutic drugs that affect the primary systems within the body
Audience: Graduate
5. Choose a relevant experimental system to test experimental hypotheses (e.g. in vitro or in vivo; animal species, etc)
Audience: Graduate
6. Design experiments which are properly controlled and which use appropriate statistical methods of data analysis
Audience: Graduate

PHMCOL-M 875 – SPECIAL TOPICS IN PHARMACOLOGY
1-3 credits.

Special topics in pharmacology. Topics may vary.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2022
Learning Outcomes:
1. Apply, analyze, or evaluate advanced theories, concepts, or methods in pharmacology
Audience: Graduate
PHMCOL-M 901 – SEMINAR AND JOURNAL CLUB
1-2 credits.

Students and staff present research reports of current interest.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2024

Learning Outcomes:
1. Organize and present a research presentation, which includes background information, data slides, conclusions, and future directions
   Audience: Graduate

2. Offer constructive feedback to peers on research presentation style and information delivery
   Audience: Graduate

3. Design experimental approaches that are properly controlled and use appropriate statistical methods of data analysis
   Audience: Graduate

4. Identify relevant experimental systems to test experimental hypotheses (e.g. in vitro or in vivo; animal species, etc)
   Audience: Graduate

PHMCOL-M 990 – RESEARCH
1-12 credits.

Research facilities of the department available to qualified students.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2024

Learning Outcomes:
1. Exhibit a broad understanding of general pharmacology principles
   Audience: Graduate

2. Conduct independent research using a variety of approaches
   Audience: Graduate

3. Think critically to address research challenges
   Audience: Graduate

4. Exhibit and foster professional and ethical conduct in their research
   Audience: Graduate

5. Collaborate with other investigators within or outside the thesis lab
   Audience: Graduate