

PHRM 5900 Advanced Pharmacology Topics

Spring Semester 2025; Graduate Syllabus

Course Director

Dr. Benedek Erdos, Associate Professor of Pharmacology, Larner College of Medicine

Syllabus

Pharmacology 5900 will be offered by the Department of Pharmacology to graduate students in the Spring Semester, 2025. This three credit-hour, team-taught course focuses on basic pharmacological principles, drug interactions with receptors, membranes, synapses, neurotransmitters, macromolecules, ion channels, the cytoskeleton, and membrane pumps. Recent studies of the molecular and cellular mechanisms of drug action are discussed, and state-of-the-art techniques for pharmacological analysis of various cellular target molecules are described.

Prerequisites

Background in Biology or Biochemistry or Permission

Time and Place

Tuesday / Thursday, 2:50 – 4:05 PM; Stafford 101

Course Faculty

Faculty	Department	Telephone	E-mail
Frances Carr	Pharmacology	656-1318	Frances.Carr@uvm.edu
Benedek Erdos	Pharmacology	656-0988	Benedek.Erdos@uvm.edu
Osama Harraz	Pharmacology	656-0782	oharraz@uvm.edu
Grant Hennig	Pharmacology	656-0859	grant.hennig@uvm.edu
Alan Howe	Pharmacology	656-9521	Alan.Howe@uvm.edu
Nicholas Klug	Pharmacology	656-0782	Nicholas.Klug@uvm.edu
Karen Lounsbury	Pharmacology	656-1319	Karen.Lounsbury@uvm.edu
Tony Morielli	Pharmacology	656-4500	Anthony.Morielli@uvm.edu
Maria Noterman	Pharmacology	656-8037	Maria.Noterman@uvm.edu

Format:

All lectures will be in-person in Waterman 427. All lecture materials (PowerPoint files, handouts, etc.) will be made available through Brightspace.

Handouts:

Handouts will be posted before each lecture. The handouts are detailed and usually contain learning objectives, appropriate background information and study questions including detailed answers to the study questions. Working with the study questions will provide an accessible and straight forward metric to master this course with ease.

Grading:

1. Five closed-book exams (5/6th of grade): Exams will consist of multiple choice and short essay questions and will cover the material of the preceding 4-5 lectures (see schedule).
2. Review paper, PowerPoint presentation and discussion (1/6th of grade)
Students are required to select a topic related to one of the general course topics and approved by the course director (the topic should be finalized with Dr. Erdos by April 10th).
 - a. The paper should be based on at least 3 primary literature references (*not review papers*) related to the selected topic. Your paper should summarize the background, results, and conclusions of the cited papers, discuss the importance of the papers in the context of the specific topic of interest, and include your assessment of the strengths and possible limitations or weaknesses of the research. The paper is due on April 24th

Format: minimum 5 pages + 1-page references,
1" margins, Font size: 11, line spacing 1.5.

- b. PowerPoint presentation – discussion: (10 slides, 10 minutes).
Each student will prepare a PowerPoint presentation consisting of 10 slides, to be presented in 10 minutes. The presentation should provide a concise overview of the selected topic, including key background information, the main objectives, and the findings from the three chosen research papers. Additionally, students should offer a critical discussion of the results and their significance within the broader field.

Graduate students are required to participate in an online presentation and discussion session, which will be scheduled during the final week of the semester. Each student will present their slides and then lead a 5-minute discussion with their peers.

- c. Students will be evaluated on the depth and clarity of their written paper, the quality and structure of their presentation, and their active participation in the discussion session.

Course Schedule:

Date	Topic	Instructor
1/14	G-protein coupled receptors	Erdos
1/16	Transcription factors	Lounsbury
1/21	Hormone receptors	Carr
1/23	The Function and Pharmacology of Receptor Kinases - I	Morielli
1/28	The Function and Pharmacology of Receptor Kinases - II	Morielli
1/30	EXAM I	
2/4	Monoclonal antibodies as therapies (<i>including COVID-19</i>)	Lounsbury
2/6	Vaccine Development (<i>including COVID-19</i>)	Lounsbury
2/11	Cyclic AMP/PKA signaling	Noterman
2/13	Cyclic GMP signaling, nitric oxide	Noterman
2/18	Cation channels (TRP channels)	Harraz
2/20	EXAM II	
2/25	Potassium channels	Huerta de la Cruz
2/27	Nicotinic receptors	Morielli
3/4	<i>No class - Town meeting day recess</i>	
3/6	Chloride channels	Harraz
3/11 – 15	<i>No classes - Spring break</i>	
3/18	Synaptic pharmacology and neurotransmission - I	Erdos
3/20	Synaptic pharmacology and neurotransmission - II	Erdos
3/25	EXAM III	
3/27	Calcium channels	Klug
4/1	Ryanodine receptors	Hennig
4/3	IP3 receptors	Hennig
4/8	Cell adhesion & cytoskeletal dynamics	Howe
4/10	Vascular function and disease	Huerta de la Cruz
4/15	EXAM IV	
4/17	Central control of the cardiovascular system	Erdos
4/22	Pharmacophysiology of the kidney	Erdos
4/24	Renin-angiotensin system	Erdos
4/29	Pharmacotherapy of obesity and metabolic syndrome	Erdos
5/1	Ocular pharmacology, retinopathy	Klug
5/5 – 5/9	EXAM V	