PHRM 3900 Topics in Molecular and Cellular Pharmacology

Spring Semester 2024; Undergraduate Syllabus

Course Director

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

Syllabus

Pharmacology 3900 will be offered by the Department of Pharmacology to advanced undergraduate students in the Spring Semester, 2024. 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.

This course is a core requirement for students pursuing the Pharmacology Minor.

Prerequisites

Background in Biology or Biochemistry or Permission

Time and Place

Tuesday / Thursday, 2:50 – 4:05 PM; Waterman 427

Course Faculty

Faculty	Department	E-mail
Frances Carr	Pharmacology	Frances.Carr@uvm.edu
Benedek Erdos	Pharmacology	Benedek.Erdos@uvm.edu
Osama Harraz	Pharmacology	oharraz@uvm.edu
Grant Hennig	Pharmacology	grant.hennig@uvm.edu
Alan Howe	Pharmacology	Alan.Howe@uvm.edu
Saúl Huerta de la Cruz	Pharmacology	Saul.Huerta-de-la-Cruz@uvm.edu
Nicholas Klug	Pharmacology	Nicholas.Klug@uvm.edu
Karen Lounsbury	Pharmacology	Karen.Lounsbury@uvm.edu
Tony Morielli	Pharmacology	Anthony.Morielli@uvm.edu
Maria Noterman	Pharmacology	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:* Exams (100 points each) will consist of multiple choice and short essay questions and will cover the material of the preceding 4-5 lectures (see schedule).

2. *Optional Review Paper*: Optional extra credit (weighted as a 6th exam, 100 points).

   The paper should be related to one of the general course topics and be based on at least 3 primary literature references (*not review papers*). 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.

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

   The paper is due on April 25th, please inform Dr. Erdos by April 11th of your intent to submit a paper and indicate the topic of your review.

Course Schedule:

Date	Topic	Instructor
1/16	G-protein coupled receptors	Erdos
1/18	Transcription factors	Lounsbury
1/23	Hormone receptors	Carr
1/25	The Function and Pharmacology of Receptor Kinases - I	Morielli
1/30	The Function and Pharmacology of Receptor Kinases - II	Morielli
2/1	**EXAM I**	
2/6	Monoclonal antibodies as therapies (*including COVID-19*)	Lounsbury
2/8	Vaccine Development (*including COVID-19*)	Lounsbury
2/13	Cyclic AMP/PKA signaling	Noterman
2/15	Cyclic GMP signaling, nitric oxide	Noterman
2/20	Cation channels (TRP channels)	Harraz
2/22	**EXAM II**	
2/27	Potassium channels	Huerta de la Cruz
2/29	Nicotinic receptors	Morielli
3/5	*No class - Town meeting day recess*	
3/7	Chloride channels	Harraz
3/11 – 15	*No classes - Spring break*	
3/19	Synaptic pharmacology and neurotransmission - I	Erdos
3/21	Synaptic pharmacology and neurotransmission - II	Erdos
3/26	**EXAM III**	
3/28	Calcium channels	Klug
4/2	Ryanodine receptors	Hennig
4/4	IP3 receptors	Hennig
4/9	Cell adhesion & cytoskeletal dynamics	Howe
4/11	Vascular function and disease	Huerta de la Cruz
4/16	**EXAM IV**	
4/18	Central control of the cardiovascular system	Erdos
4/23	Pharmacophysiology of the kidney	Erdos
4/25	Renin-angiotensin system	Erdos
4/30	Pharmacotherapy of obesity and metabolic syndrome	Erdos
5/2	Ocular pharmacology, retinopathy	Klug
	EXAM V	