PHCO 701

Short title Molecular Pharmacology

Long title Introduction to Molecular Pharmacology

Effective term Fall

Course units/hours 3 credit hours M/W/F 9:00am-9:50am in 4007 Genetic Medicine Bldg.

Grading basis (GRAD – H,P,L, F)

Course Component (lecture or lab) lecture

Course Description

This is a graduate-level first year course outlining the basics of molecular pharmacology, including molecular biology, bioinformatics, drug/receptor interactions, receptor and ion channels, regulation of second messengers, drug metabolism and system pharmacology. Permission of the instructor required for registration. Three credit hours a week.

Course objectives (learning outcomes):

The objectives of this course are to provide graduate students in biomedical research programs familiarity with the molecular principles of pharmacology involved in the design and action of drugs. Students will increase critical thinking skills in the context of the specific topics listed in the syllabus, which includes molecular biology underlying drug development, key drugable pathways and the interactions between drugs and human body. By the end of this course students should be familiar with molecular principles of drug development including knowledge of gene expression pathways related to drugs, key drugable targets and the interaction between drugs and their receptors. Students should have working knowledge sufficient to apply those principles to new research topics and to propose appropriate strategies to solve relevant research questions.

Course Assignments

Reading assignments may be posted by the individual instructors and will be a combination of review articles, research papers of seminal importance to the field, and recent research articles of significant impact. There may be written assignments, including quizzes/homework and short essay-style exams designed to test both the assimilation of the readings and the application of principles to new scientific scenarios posted by individual instructors.

Assessments

Achievement of course objectives and individual student grades will be determined from one take home project and two in-class exams at the end of each of three modules. By the end of the course, the students should have a good understand the principles of drug development and able to use the tools and knowledge introduced in the course in a new scientific questions related to drug actions. The students should also demonstrate a working vocabulary in the field and have a working knowledge of the pharmacologic principles.

		Block 1: Pharmacological Targets **Block Leader: Dohlman**
8/10/2020	Graves	Introduction / History of Pharmacology
8/12/2020	Dohlman	Pharmacology I
8/14/2020	Dohlman	Pharmacology II
8/17/2020	Roth	GPCRs
8/19/2020	Roth	GPCRs
8/21/2020	Kenakin	Bias
8/24/2020		EXAM 1: Take Home Exam
		Block 2: Signaling Pathways **Block Leader: Kenakin**
8/26/2020	Graves	Kinase networks / Receptor kinases
8/28/2020	Graves	Second messengers
8/31/2020	Sondek	Membrane Biology
9/2/2020	Legant	Calcium
9/4/2020	Cox	Ras family of small GTPases
9/7/2020	Labor Day	
9/9/2020	Kenakin	Take Home EXAM 2
		Block 3: Technology and Systems Pharmacology **Block Leader: Hahn**
9/11/2020	Roth	Technology
9/14/2020	Graves	The Application of Mass Spectrometry in Pharmacology
9/16/2020	Pinkin	Chemical Biology in Drug Discovery
9/18/2020	Legant	Modern Fluorescence Microscopy
9/21/2020	Hahn	Molecular Imaging Tools
9/23/2020		Take Home EXAM 3
		Block 4: Informatics and Modeling Block Leader: Elston
9/25/2020	Brown	Protein Expression, Purification, Characterization, and Interactions
9/28/2020	Brown	Protein Structure Determination and Structural Bioinformatics
9/30/2020	Elston	Modeling of Signaling networks
10/2/2020	Gomez	Analysis of Signaling Networks
10/5/2020	Roth	Introduction to Systems Biology
10/7/2020	Johnson	Precision Medicine
10/9/2020	Kenakin	Fitting Data to models to predict Activity
10/12/2020	(University Day)	
10/14/2020	Kenakin	Take Home EXAM 4
		Block 5: Emerging Therapies **Block Leader: Graves**
10/16/2020	Emanuele	Cell Cycle Regulation
10/19/2020	Emanuele	Developing a Cell Cycle small Molecule
10/21/2020	Der	Cancer Immunotherapy
10/23/2020	Der	Mechnisms of Resistance to targeted therapies
10/26/2020	Song	Stem cell therapy
10/28/2020	Duncan	Principles of Biologic Therapy
10/30/2020	Dohlman	Genetic Therapy
11/2/2020	Moorman	Covid-19
		Block 6: Genetics and Epigenetics **Block Leader: Calabrese**
11/4/2020	Samulski	Gene Therapy
11/6/2020	Calabese	Genome structure and Diversity
11/9/2020	Calabrese	Transcriptors
11/11/2020	Calabrese	non Coding RNA
11/13/2020	Calabrese	Epigenetics
11/16/2020	Dominguez	SiRNA / Antisense / CRISPR
	Calabrese	Take Home EXAM 6
11/17/2020	Classes End	