Research Techniques in Medicinal Chemistry (Foundations in Drug Discovery)
Fall 2023
Tues, Thurs 3:40-5:00 RM 130
Course Numbers: 16:663:501:01; 30:715:451:01

Instructor:
Matthew Moschitto; Ernest Mario School of Pharmacy, William Levine Hall RM330. *Course Coordinator*
Email: m.moschitto@rutgers.edu; I will strive to answer emails within 24 h. If I do not, please resend the email.
Office Hours: TBD, by appointment.

Jun Wang; Ernest Mario School of Pharmacy, William Levine Hall Rm 326
Email: junwang@pharmacy.rutgers.edu
Office Hours: TBD, by appointment.

Course Description: Modern Drug Discovery covers the important biochemical processes involved in the development of pharmaceuticals. This course provides an overview of the drug discovery process and provides a foundation for students interested in a career in drug discovery by applying both organic and biochemical principles. There are three parts to this course: (i) Understanding the drug discovery process (2) Common targets in drug discovery including receptors, kinases, GPCRs, ion channels, metabolic enzymes, and DNA; and (3) inhibitor design and evaluation including assay development, enzymology, PK/PD studies, and metabolism. This course is designed as an introductory graduate course or an advanced undergraduate course for students who have taken two semesters of organic chemistry.

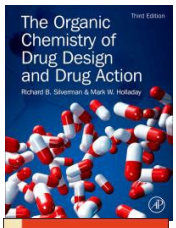
Grading:

3 Exams (including final)	25% each (63 % total)
Problem Sets	20%
Class Participation and Preparation	5%

Exams: Two midterm exams and a final will be given. Each midterm exam will be 3 h in length and be composed of the preceding sections' material. The final will be split between material from the first two exams and new material. Exam material will be based on lecture and problem set material only.

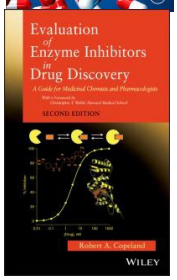
Problem Sets: Four problem sets/projects will be assigned in this course. Problem sets will be posted on Canvas. Their due date will be listed on canvas and in the syllabus. Students should not share answers with each other and work independently. Copying another student's answers will be considered plagiarism (see below). It is permitted, however, to discuss the problems between students. It is in your best interest to work through the problems individually to understand the material. Students should not google or look up and copy answers from online sources either, this includes programs such as Reaxys and Scifinder.

Books and Handouts: The course generally follows two textbooks. The reading assigned are not required but are suggestions to supplement the lecture material. These textbooks are not required for purchase but are incredibly useful textbooks for any Medicinal Chemist. Handouts will be posted on the class canvas page and similarly are suggestions (unless otherwise noted in a problem set).



1. Silverman RB, Holladay MW. *The Organic Chemistry of Drug Design and Drug Action*. Third edition. Amsterdam: Elsevier; 2014.

This book is available online free from Rutgers Library at:
https://ebookcentral.proquest.com/lib/rutgers-ebooks/detail.action?docID=5754489



2. Copeland, R. A. *Evaluation of enzyme inhibitors in drug discovery: A guide for medicinal chemists and pharmacologists*. Somerset: John Wiley & Sons, Incorporated, 2013.
This book is available online free from Rutgers Library at:
https://ebookcentral.proquest.com/lib/rutgers-ebooks/detail.action?docID=1120975#

Computer Software: This course will require the use of various software platforms. This software is available free of charge from the university and can be downloaded at software.rutgers.edu unless otherwise noted. If you need assistance, please ask. A computer lab is located in EMSOP room 323. Please email Michael Delrio (delriomi@pharmacy.rutgers.edu) if you require access. The following software will be used or discussed in class:

1. Chemdraw
2. Endnote
3. Origin Pro
4. Pymol (https://pymol.org/2/)

Academic Integrity: Rutgers University's policy on academic integrity will be strictly followed. If a student is found to be cheating during an exam or problem set, a grade of "F" will be given for the exam or problem set and the incident will be reported to the school. Details of Rutgers University's policy can be found at http://academicintegrity.rutgers.edu/academic-integrity-policy/.

Syllabus						
Date	Lecture Number	Topic	Specific topics	Readings	Instructor	PS due date
9/7	1	Introduction to Drug Discovery		Silverman 1	JW1	
9/9	2	Introduction to drug discovery		Silverman 2	JW2	
9/12	3	Drug-Receptor Interactions	H-Bonds, covalent bonding, electrostatic, hydrophobic interactions	Silverman 3.1-3.22	MJM1	
9/14	4	Drug Receptor Interactions		Silverman 3.23-3.3	MJM2	
9/19	5	Enzyme Catalysis		Silverman 4; 5.1	MJM3	
9/21	6	Mechanism Based enzyme inactivators		Silverman 5.3	MJM4	PS1
9/26	7	Targeting Proteases		Lecture slides	JW3	
9/28	8	Targeting Kinases		Lecture slides	JW4	
10/3	10	Targeting GPCRs		Lecture slides	JW5	
10/5	11	Targeting Ion Channels		Lecture slides	JW6	
10/10	E1	**EXAM 1**	**Lectures 1-10**			
10/12	O	No Class	Attend PACSFOCS			
10/17	12	Targeting DNA		Silverman 6	MJM5	
10/19	13	Targeting DNA			MJM6	
10/24	14	Inhibitor Evaluation	Enzyme kinetics Reversible and Irreversible inhibitors	Copeland 2.4-2.6, 3.1-3.6, 5.1-5.4,	MJM7	
10/26	15	Inhibitor evaluation	Slow binding inhibitors Tight binding inhibitors	Copeland 6.1-6.4, 9.1-9.2	MJM8	PS2(Targets)
10/31	16	Inhibitor Evaluation			MJM9	
11/2	17	Assays	Assay set up; fluorescence, ITC, DSF,	Copeland 4	MJM10	
11/7	18	Assays		Copeland 4	MJM11	
11/9	O	Open			MJM	PS3 (Eval)
11/14	E2	Exam 2	**Lectures 11-18**			
11/16	19	Drug Resistance and synergism		Silverman 7	MJM12	
11/21	20	Antimicrobial drug resistance			JW7	
11/28	21	Drug Metabolism	CH/N/O oxidations	Silverman 8	MJM13	

11/30	22	Drug Metabolism	Reductions Phase II transformations		MJM14	
12/5	23	*In vitro* pharmacokinetics in drug discovery		Copeland 10	JW8	
12/7	24	*In vivo* pharmacokinetics in drug discovery			JW9	
12/12	O	Projects/Open			MJM15	PS4
TBD	**FINAL**		**Lectures: 50%: 19-24** **50% 1-18**			