



CHM 6306

Special Topics in Biological Chemistry: “Structural Pharmacology”

Spring 2022 (Jan 6 – Apr 19)

Instructor

Dr. Matthew Eddy
 matthew.eddy@ufl.edu
 CBB 302C, 352 294 1048 (office)

Office Hours

Wed 3:00 - 4:00 PM & by appointment. I am also generally available via email and will make every attempt to respond to emails in 24 hours. If you wait to the last minute to contact me regarding questions for an assignment, I may not get back to you before the assignment due date.

Lectures

T 9:35 – 10:25 AM, Th 9:35 – 11:30 AM. Lectures will be held in a hybrid format and links to lecture materials will be posted on the course Canvas site.

Required Textbooks

There are no required textbooks for this course.

Recommended Reading

The following textbooks are recommended and provide information that complements lecture material. These textbooks are made available through the UF Libraries Reserve and are found either as electronic texts or available to check out for a limited time from the science library.

- “Molecular Biology of the Cell”, 6th edition, by Bruce Alberts, Alexander Johnson, et al.

SPRING SEMESTER 2022							
	S	M	T	W	T	F	S
Jan.							Holiday 1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	Holiday 17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31					
Feb.			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28					
Mar.			1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31		
Apr.						1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
May	1	2	3	4	5	6	7

- “Pharmacology in Drug Discovery and Development: Understanding Drug Response” (2017) by Terry Kenakin
- “A Pharmacology Primer: Techniques for More Effective and Strategic Drug Discovery” (2015), 4th edition, by Terry Kenakin
- “Cell Biology” (2008) by Pollard, Earnshaw, Lippincott-Schwartz, and Johnson
- “The Membranes of Cells” by Philip L. Yeagle.

Additional selections from texts will be announced on the canvas site and provided by the instructor.

Course Description

This course presents an overview to modern biophysical and structural biology techniques employed in the study of membrane proteins, with special emphasis on techniques and approaches used to study human G protein-coupled receptors (GPCRs). GPCRs are integral membrane protein cell surface receptors found in the plasma membranes of Eukaryotic organisms. Background information will be provided on pharmacology, cell signaling generally and biochemical and biophysical tools. Applications to drug discovery will be discussed. This will serve as a foundation for students to critically evaluate and present current relevant literature. Broadly, topics include: structural biology (i.e., x-ray crystallography, cryo-EM, and nuclear magnetic resonance), pharmacology, biological membranes and their properties, protein engineering, and applicable biophysical methods (e.g. fluorescence-based techniques, ligand binding techniques, etc).

Course Objectives

The overall learning objective of this course is to develop an understanding of modern experimental techniques used to study cell surface receptors. The following are more specific course objectives.

- Develop an understanding of modern techniques used to study membrane proteins
- Understand fundamental concepts in pharmacology
- Understand how to evaluate protein structure-function relationships
- Develop an understanding of biological signaling pathways involving human receptor proteins
- Learn to use software for evaluation protein structures and their chemical and physical properties

A secondary goal of this course is to provide training in oral and written professional scientific communication. The following learning objectives related to this goal are covered in this course.

- Effectively search the scientific literature
- Read and understand scientific literature and critically assess presented data in publications
- Organize a professional quality scientific publication
- Design professional quality scientific figures

- Organize an effective oral presentation review of a scientific topic

Course Grade Computation

Your letter grade will be derived from weighting the following components of your performance in the class:

30%	Project-Based Assignments & Additional Written Assignments
20%	Online Quizzes
25%	Written topical review paper assignments
15%	In-class oral presentations
10%	Final presentations

Your course grade will be determined from your total course performance percentage as follows:

>90%	A
83% - 89%	A-
74% - 82%	B+
66% - 73%	B
60% - 65%	B-
55% - 59%	C+
50% - 54%	C
45% - 49%	D
< 45%	E

All grades will be posted in the Canvas GradeBook, as available. Final grades will include rounding. Please note, Canvas does NOT round. Example: If you earn an 89.5 or greater, we will round your final grade up when submitting grades. There is no “curving” grades for the class.

UF's Grading Policy: <http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html>

Cell Phones

Please put all cell phones and other digital devices on “silent mode” during all class periods and avoid use during class.

Class Attendance and Make-Up Policy

Class attendance and participation is expected. Excused absences are allowed in accordance with UF policy. Late final project proposal papers will not be accepted.

Late Submission Policy

Assignments received past posted due dates will receive a late penalty of 10% per day unless the late submission is approved through prior communication with course instructor. If something arises that prevents you from completing the assignment on time, contact the course instructor right away to request an extension.

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluations

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>

Materials and Supplies Fees

There are no additional fees for this course.

University Honor Policy

This class will operate under the policies of the student honor code, which can be found at: <http://www.registrar.ufl.edu/catalog/policies/students.html>. The students and instructor are honor-bound to comply with the Honors Pledge: *We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*

More specific to this course is the expectation that any submitted written assignments are in your own language. This means that submission of verbatim or nearly-verbatim text taken from other sources and repurposed for your own assignments without proper acknowledgement of the original citation will be considered a violation of the honor code and treated as such.

Zoom Presence Policy

This class may contain hybrid lectures, i.e. lectures that are simultaneously given in-person and broadcast online via Zoom. Our class lectures may be audio and visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with

their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Counseling and Wellness Center

Contact information for the Counseling and Wellness Center:

<http://www.counseling.ufl.edu/cwc/Default.aspx>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Policy on In-class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student

Tentative Lecture Schedule

Week	Dates	Topics	Review Article Dates
1	Jan 6 – Jan 16	Introduction to pharmacology, receptor theory, overview of cell surface receptors	
2	Jan 17 – 21	Molecular biology of GPCRs and signaling (part 1)	
3	Jan 24 – 28	Molecular biology of GPCRs and signaling (part 2)	Jan 24: Prospectus Due
4	Jan 31 – Feb 4	Molecular biology of GPCRs and signaling (part 3)	Feb 7: Reference List Due
5	Feb 7 – 11	GPCR structural biology (part 1): x-ray crystallography and protein engineering	Feb 14: Outline Due
6	Feb 14 – 18	GPCR structural biology (part 2): x-ray crystallography & cryo-EM	
7	Feb 21 – 25	Biophysical Methods Part 1: NMR in solution	Feb 28: Figures & Figure Legends Draft Due
8	Feb 28 – Mar 4	Biophysical Methods Part 2: NMR in solution and in solids	
9	Mar 7 – 11	Biophysical Methods Part 3: fluorescence techniques	Mar 14: Draft 1 Due
10	Mar 14 – 18	Chemical, and physical properties of biological membranes	Instructor Comments Returned
11	Mar 21 – 25	GPCRs, membrane proteins, and methods for studying lipid-protein interactions	Mar 28: Peer Reviewer Comments Due
12	Mar 28 – Apr 1	GPCRs & biological membranes continued	
13	Apr 5 – 11	Advanced topics 1: polypharmacology, biased signaling, structure-based drug design	
14	Apr 4 – 8	Advanced topics 3: optogenetics, designer drug-receptor systems	Presentations During Final Week of Class
15	Apr 11 – 19	Final Presentations; Last day of class April 20	April 25: Final Papers Due

Disclaimer for this document

Note: All aspects of course operations, including grading, course policy and policy execution, are subject to change at the discretion of the course instructor.

If you have further questions, please contact me. Have a great semester!

Sincerely,
Matthew Eddy