

CHM 6306 Special Topics in Biological Chemistry: "Structural Pharmacology"

Fall 2024 (Aug 22 – Dec 4)

Deg. Cert

Holiday 11

Grades Due

Dec.

Holiday

27 28

Reading Days 5 6

			FALL SEMESTER 2024							
Instructor		S	М	Т	W	Т	F	S		
Dr. Matthew Eddy	Aug.	18	19	Re 20 Drop/Add	egistration 21	Drop/	'Add 23	24		
maillew.eddy@uii.edu		25	26	27	28	29	30	31		
SFH 302C, 352 294 1048 (office)	Sept.	1	Holiday 2	3	4	5	6	7		
		8	9	10	11	12	13	14		
Office Hours		15	16	17	18	19	20	21		
Tue, 2:00 – 3:00 pm & by appointment		22	23	24	25	26	27	28		
		29	30							
Communication	Oct.			1	2	3	4	5		
All electronic communication should be conducted through		6	7	8	9	10	11	12		
the course Canvas e-learning site.		13	14	15	16	17	Homec 18	toming 19		
		20	21	22	23	24	25	26		
I am generally available via email and will make every		27	28	29	30	31				
attempt to respond in 24 hours. If you wait to the last	Nov.						1	2		
		3	4	5	6	7	8	9		

minute to contact me regarding questions for an assignment, I may not get back to you before the assignment due date.

Lectures

M,W,F 1:55 - 2:45 PM, FLI109

Required Textbooks

There are no required textbooks for this course.

Recommended Reading

The following textbooks are recommended. Material from these texts will be used throughout the course. 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.
- "An Introduction to Medicinal Chemistry", 7th edition, by Graham Patrick •

- "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.
- "Membrane Structural Biology: With Biochemical and Biophysical Foundations", 2nd edition by Mary Luckey

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

Course Description

This course presents an in-depth exploration of advanced biophysical and structural biology techniques employed to study membrane proteins, with an emphasis on techniques and approaches used to study G protein-coupled receptors (GPCRs). Students will gain a comprehensive understanding of receptor pharmacology and the molecular underpinnings of cellular signaling, linking cellular signaling processes to physiological outcomes and explore the implications of signaling misregulation in diseases. The course will cover cutting-edge topics in cellular biophysics and structural biology, including cryo-electron microscopy and cryo-electron tomography, x-ray crystallography, single-molecule imaging, and nuclear magnetic resonance. This course will highlight critical applications of these techniques in drug discovery and development, providing students with insights into how these advanced tools are shaping the future of pharmacology and therapeutic intervention.

Course Objectives

- **Understand and explain** the fundamental principles of receptor pharmacology and the molecular mechanisms of cellular signaling
- **Analyze** the structures and dynamics of membrane proteins using advanced biophysical techniques such as cryo-electron microscopy and X-ray crystallography.
- **Critically evaluate** the strengths and limitations of different structural biology techniques in the context of studying membrane proteins
- **Design and propose** experimental approaches using cutting-edge techniques to investigate specific questions related to membrane protein function and signaling.
- **Integrate** knowledge of cellular signaling pathways with physiological outcomes, exploring how misregulation of these pathways can lead to various diseases
- **Develop proficiency** in searching, reading, and critically evaluating scientific literature. Be able to assess data quality and interpret research findings effectively.
- **Organize and present** analysis of the scientific literature in a professional-quality scientific publication, complete with well-designed figures.

• Enhance skills in professional scientific communication by organizing and delivering an effective oral presentation on a selected scientific topic, demonstrating the ability to convey complex ideas clearly and persuasively to both specialized and general audiences.

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% Quizzes
30% Written topical review paper assignments
10% In-class oral presentations
10% Final presentations

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

>93%	А
90% - 93%	A-
87% - 89%	B+
83% - 86%	В
80% - 82%	B-
77% - 79%	C+
72% - 76%	С
70% - 71%	D
< 70%	Е

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

All cell phones and other digital devices must be on "silent mode" during all class periods and avoid use during class. Use of cell phones for messaging for non-emergency uses is not permitted during class. Failure to adhere to this policy will result in a reduction in your final grade.

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.

COVID & General Illness Policy

In response to COVID-19, the following recommendations are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves, our neighbors, and our loved ones.

- If you are not vaccinated, get vaccinated. Vaccines are readily available and have been demonstrated to be safe and effective against the COVID-19 virus. Visit one.uf for screening / testing and vaccination opportunities.
- If you are sick, stay home. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 to be evaluated.
- Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work.

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.

Students with disabilities have an equal right to use and benefit from resources at the George A. Smathers Libraries, including (but not limited to) Course Reserve materials. To ensure this right, students with disabilities:

- Have the responsibility to identify themselves as needing appropriate, reasonable accommodations for their disabilities
- Have the responsibility for making their needs known in a timely manner
- Have the same obligation as any library user to comply with library policies and procedures

The George A. Smathers Libraries Course Reserves Unit will work with patrons needing assistance or accommodations to access course reserve materials.

Regrade policy

If you believe a mistake has been made on the grading, please notify the professor and your TA through Canvas within 1 week of receiving the assignment. We will look at it and evaluate on a case-by-case basis. If a re-grade is requested, the entire assignment will be reviewed. If an error was made in favor of a student, for example by not catching a mistake made during the first submission, then points will also be deducted upon re-grading. If a lower score results from regrading, then the lower score will stand.

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.

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 to 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 their voices recorded. If you are not willing to consent to have their 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

Dates	Topics	Review Article Dates
8/22 - 8/30	Introduction to membrane proteins & cell signaling	
9/2	UF HOLIDAY	
9/3-9/9	Principles of receptor pharmacology	Sep 6: Prospectus Due
9/9-9/16	Cellular signaling pathways	
9/16-9/23	Cellular signaling and physiology	Sep 23: Reference List Due
9/23-9/30	Introduction to structural biology techniques	
9/30-10/7	X-ray crystallography & cryo-EM	
10/7-10/14	Protein dynamics & NMR	Oct 11: Outline Due
10/14-	Single-molecule imaging techniques	
10/21		
10/21-	Biophysical methods: theory and practice	Oct 25: Figures & Figure Legends
10/28		Draft Due
10/28-11/4	Chemical, and physical properties of biological	
	membranes	
11/4-11/8	Lipid-protein interactions and their influence on drug	
	responses	
11/11	UF HOLIDAY	
11/12-	Advanced structural biology topics: electron	Nov 11: Draft 1 Due
11/18	tomography, integrative approaches	
11/18-	Advanced pharmacology topics:polypharmacology,	Nov 18: Instructor Comments
11/22	biased signaling, structure-based drug design	Returned
11/25-	UF HOLIDAY	
11/29		
12/2-12/5	Final Presentations; Last day of class Dec 4	Dec 2: Peer Reviewer Comments
		Due; Dec 9: Final Papers Due

Disclaimer for this document

Note: 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