



# CHM 6306/CHM 4930

## Special Topics in Biological Chemistry: “Structural Pharmacology”

Spring 2021 (Jan 11 – Apr 21)

### Course Website

#### Instructor

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

#### Office Hours

Via Zoom, Tue 4:00 - 5:00 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 3 – 3:50 PM, Th 1:55 – 3:50 PM, held via Zoom.  
 Links to lectures posted on the course Canvas site.  
 See also the “Zoom Presence Policy” section below.

#### 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”, 6<sup>th</sup> edition, by Bruce Alberts, Alexander Johnson, et al.

#### SPRING SEMESTER 2021

	S	M	T	W	T	F	S
Jan.						Holiday 1	2
	3	4	5	6	7	Registration 8	9
	10	11	12	13	14	15	16
	17	Holiday 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	Reading Days 22	23	24
	25	26	27	28	29	30	Commencement

- “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), 4<sup>th</sup> 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 integrative techniques 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 cell signaling generally and the biochemical and biophysical tools used to investigate cell surface receptors. 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

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:

- 35% Written assignments
- 30% In-class oral presentations
- 20% Written topical review paper
- 15% 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/](http://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**

Our class sessions may be audio 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.

## Tentative Lecture Schedule

<b>Week</b>	<b>Dates</b>	<b>Topics</b>	<b>Review Article Dates</b>
1	Jan 11 – Jan 17	Introduction to pharmacology, receptor theory, overview of cell surface receptors	
2	Jan 18 – 24	Molecular biology of GPCRs and signaling (part 1)	
3	Jan 25 – 31	Molecular biology of GPCRs and signaling (part 2)	<b>Jan 24: Prospectus Due</b>
4	Feb 1 – 7	Molecular biology of GPCRs and signaling (part 3)	<b>Feb 7: Reference List Due</b>
5	Feb 8 – 14	GPCR structural biology (part 1): x-ray crystallography and protein engineering	<b>Feb 14: Outline Due</b>
6	Feb 15 – 21	GPCR structural biology (part 2): x-ray crystallography & cryo-EM	
7	Feb 22 – 28	Biophysical Methods Part 1: NMR in solution	<b>Feb 28: Figures &amp; Figure Legends Draft Due</b>
8	Mar 1 – 7	Biophysical Methods Part 2: NMR in solution and in solids	
9	Mar 8 – 14	Biophysical Methods Part 3: fluorescence techniques	<b>Mar 14: Draft 1 Due</b>
10	Mar 15 – 21	Chemical, and physical properties of biological membranes	<b>Instructor Comments Returned</b>
11	Mar 22 – 28	GPCRs, membrane proteins, and methods for studying lipid-protein interactions	<b>Mar 28: Peer Reviewer Comments Due</b>
12	Mar 29 – Apr 4	GPCRs & biological membranes continued	
13	Apr 5 – 11	Advanced topics 1: polypharmacology, biased signaling, structure-based drug design	
14	Apr 12 – 18	Advanced topics 3: optogenetics, designer drug-receptor systems	<b>Presentations During Final Week of Class</b>
15	Apr 19 – 21	Final Presentations; Last day of class April 20	<b>April 25: Final Papers Due</b>

### 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