

CHM 6306 – Special Topics in Biological Chemistry

“Structural and Biophysical Methods for Studying Cell Surface Receptor Proteins”

Instructor

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Lectures

M/W/F 3-3:50 PM, Matherly Hall 0115

Office Hours

Tu/Th 2-4 PM, or by appointment; I am also generally available via email

Required Textbooks

No required textbooks

Recommended Reading

The following are suggestions, as we will likely take selected sections from these and additional sources: “A Pharmacology Primer: Techniques for More Effective and Strategic Drug Discovery” by Terry Kenakin, 4th edition; “The Membranes of Cells” by Philip L. Yeagle; additional reading material provided by course instructor.

Course Description

Cell surface receptors are integral membrane proteins localized in the plasma membrane of Eukaryotic organisms. In particular, this course focuses on G protein-coupled receptors (GPCRs) and aims to survey what we know about these fascinating proteins and what techniques and approaches were used to obtain that knowledge. Background will be provided on the biochemical and biophysical tools used to investigate cell surface receptors, which 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. single molecule fluorescence).

Course Objectives

Major goals for completing this course are for students to be able to critically evaluate current topical scientific literature and to clearly communicate their own independent scientific ideas in writing and through oral presentations. Secondary goals are for students to develop a broad

understanding of different biophysical methods and their relative strengths, and how different techniques can best be leveraged to address specific biological questions.

Grading

Grades will be determined from the following criteria:

- 25% Class participation
- 30% In-class presentations
- 30% Written topical review paper
- 15% Final Presentations

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. Late final project proposal papers will not be accepted.

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, instructor, and TAs 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.***

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

Weeks	Dates	Topics
1 – 2	Aug 22 – Sept 3	The beginning of pharmacology, receptor theory, overview of cell surface receptors
2	Sept 3 – 10	Molecular biology of GPCRs and signaling, introduction to the structures of GPCRs
3	Sept 10 – 17	GPCR structural biology (part 1): x-ray crystallography and protein engineering
4	Sept 17 – 24	GPCR structural biology (part 2): x-ray crystallography and cryo-EM
5	Sept 24 – Oct 1	Conformational Dynamics of GPCRs (part 1): NMR in solution
6	Oct 1 – 8	Conformational Dynamics of GPCRs (part 2): NMR in solution and in solids
7	Oct 8 – 15	Conformational Dynamics of GPCRs (part 3): NMR and complementary biophysical techniques
8	Oct 15 – 22	GPCRs and biological membranes (part 1)
9	Oct 22 – 29	GPCRs and biological membranes (part 2)
10	Nov 5 – 12	GPCRs and biological membranes (part 3)
11	Nov 12 – 19	GPCRs as tools for dissecting biological phenomena (i.e. optogenetics and other <i>in vivo</i> methods)
12	Nov 19 – 26	The future of GPCR drug discovery: polypharmacology, biased signaling, structure-based drug design
13	Dec 3 – 5	The future of GPCR drug discovery: polypharmacology, biased signaling, structure-based drug design
14	Dec 5 – 12	Final Presentations