BIBC 194/BGGN 280
BIOCHEMISTRY OF CELL SIGNALING
Spring 2021

Class time and zoom link	Thursday 9:30am-10:50am https://ucsd.zoom.us/j/95824687939 Meeting ID: 958 2468 7939
Instructor	Enfu Hui Email: enfuhui@ucsd.edu
Office Hours	Monday 3-4 pm via zoom https://ucsd.zoom.us/j/2474236422 Meeting ID: 247 423 6422
Course Website	https://canvas.ucsd.edu/courses/24783
Text book	Not required. You may find the recommended textbook to be useful references for review of relevant background material: **Lehninger Principles of Biochemistry**, by David Nelson and Michael Cox. Additional related research or review articles for support of your scholarly presentations can be found using the PubMed online database (https://www.ncbi.nlm.nih.gov/pubmed/).
Prerequisites	BIBC100 (Structural Biochemistry) or BIBC102 (Metabolic Biochemistry). It is highly recommended to have completed BICD110 (Cell Biology) and BICD140 (Immunology). If a prerequisite has been waived to allow you to take this class, it is your personal responsibility to make up any deficiencies that you may have.
Important Dates	• **April 5** or earlier: email me (enfuhui@ucsd.edu) a preference list for the 8 papers I picked for the class (seminars 3-10). I will assign the papers on a first come, first serve basis. Each paper will be assigned to a group of four students. If more than 4 of you pick one paper as your first choice, I will assign the paper to the first 4 students that emailed me. If you don't get your first choice, it means that you are too slow in emailing me, and you will likely get your 2nd or 3rd choice. If you never email me about your preferences, then you will be randomly assigned. • **April 7**: group assignment will be posted on Canvas (https://canvas.ucsd.edu/courses/24783**).** First group will present on April 15. • For other important dates, see the Course Schedule below.

COURSE SUMMARY

Multiple cell types in our body join together to form tissues to execute specific functions. The survival and function of each cell depend on receiving and processing information (signals) from

the environment. Cell-cell communication is also critical for our immune cells to recognize and destroy cancer cells and virus infected cells. Cells detect signals using specialized cell surface proteins called receptors, which coordinate with proteins and lipid molecules inside of the cells to convert the signal to a cascade of biochemical events that ultimately lead to cell division, differentiation, motility and/or secretion of chemical substances. In this course, we will discuss primary research articles that uncover how an external signal triggers a cell surface receptor, how the signal is relayed inside the cell, how signaling molecules are self-organized, and how to rewire the signaling networks to engineer cells with novel, desired functionalities. Special emphasis will be placed on signal transduction and engineering of immune cells that is related to cancer immunotherapy, an exciting and fast-moving field. Throughout the course, you will acquire the skills to interpret, evaluate, and present primary literature.

COURSE FORMAT

We will have weekly seminar-style presentations. You will be a member of a team of 4-6 students. Each group will be assigned with one primary research paper to present a 60 minutes' seminar, including approximately 45 minutes for the presentation and 15 minutes for questions and discussions. The team members should collaborate to synthesize a cohesive presentation, and each student should present some portion of the presentation. EACH presenter must be able to clearly explain ANY part of the assigned paper.

Due to the COVID19 pandemic, all lectures/presentations will take place via zoom and recorded. The presenting group will present the PPT from their own computers and share the screen with the entire class. The presenters must have their camera ON during the presentation.

PRESENTATION CONTENT

Presentations should be thoroughly prepared and clearly delivered. There should be several components of your presentation:

I. **Background & Introduction**: You should begin with an introduction that provides the context of the work. Make sure to provide adequate background, so that the class can understand the rationale behind the study. For example, what is the biological significance of the signaling pathway or receptor that authors study? What is the question they were trying to address? Why was it an important question? It is likely that you will need to read additional articles, such as some of the citations in the article's introduction section, or a review article. Oftentimes, it is helpful to show a figure or two from review articles to describe the bigger context of the research or the molecules of interest.

II. **Figures & Tables**: You should describe main figures and tables in the article, explaining the techniques they used and the results they obtained. It is important to highlight controls that are key for the data interpretation. You may also cover some supplemental material if they can help you convey the points. Inclusion of movies is usually a great way to engage the audience. For complex experiments, you are also encouraged to generate customized animations or cartoons to help your explanation.

III. **Conclusion & Implications**: You should close the presentation with a discussion of the major conclusion of the paper. Showing a model to summarize the key findings is also helpful. Discuss the overall contribution to the field, the limitation of the work, and possible future studies that can build on this work.

There are four major questions should be addressed during the presentation:

1. What is the most important conclusion and take home message?

2. What is the most critical experiment that supports their main conclusion?
3. Are there major caveats in the study?
4. What are the most important follow up questions that should be addressed?

Please bring a laptop to use for your group's presentation. As a back-up plan, please also prepare a PC compatible presentation and bring it on a memory stick before the class. This way, in case your laptop fails to communicate with the projector, you will be able to use Dr. Hui's PC laptop for the presentation.

CONTACT INFORMATION: If you have questions that have not been answered by the discussion board, you can contact Professor Hui by email (enfuhui@ucsd.edu).
Please make sure that the subject line of your email includes "**BIBC 194/BGGN 280**".

OFFICE HOURS: Professor Hui's office hours will be held on zoom, at **3-4 pm, Monday**.

GRADING:

Your performance in the course will be evaluated based on three aspects:

1. Oral presentation of the assigned paper
2. In-class polling questions
3. Peer evaluation forms

You can earn up to 103 points for the course. Below is a breakdown:

1. **Oral presentation of the assigned paper** (**60 pts** = 45 pts from peer evaluation + 15 pts from professor evaluation)**:** Your presentation will be graded based on the cohesiveness of the presentation, the effectiveness of your slides, how well you dissect the paper, how clearly you express you points, and whether you are able to put the work is a bigger context:
    - 45 pts (or 75% of the 60 pts) in this category will be based on peer evaluation (45 pts). Please refer to the **Peer Evaluation Form** for grading rubrics. *Every member of the team will share the same credit.*
    - 15 pts (or 25% of the 60 pts) will be based on professor evaluation. *This credit will likely vary for members within the same team,* based on the effort you put in and the effectiveness of your parts of presentation.
2. **In-class polling questions** (**36 pts** = 27 pts for participation + 9 pts for correctness). There will be a total 18 multiple-choice polling questions for the entire course, two per lecture (except the first week). The first poll will typically take place within 10 minutes of the starting time, to check very basic facts of the paper. The second quiz will typically take place at the end of the presentation, to check your understanding about the paper.
    - If you submit an incorrect response for a poll, you will earn 1.5 points for participation.

- If you submit the correct response for a poll, you will earn 2 points (0.5 point for correctness).
- If you do not submit a response, you will earn zero point for the

3. **Peer evaluation forms** (**7 pts**): for each seminar that are you are not presenting, you are asked to submit a **Peer Evaluation Form** to rate/comment on the quality of the presentation. There are a total seven evaluation forms to submit for the course, and each submission will earn you 1 point.

Letter grades will be assigned as follows:

90-103: A
80-90: B
70-80: C
60-70: D
Below 60: F

ACADEMIC INTEGRITY: Academic dishonesty will not be tolerated in this course. According to UCSD policy, academic dishonesty includes:

- completing assignments for another student
- allowing another student to complete an assignment for you
- copying another student's work on an assignment
- allowing another student to copy your work on an assignment
- incorporating plagiarized material into an assignment

Any issues with academic dishonesty will be reported to the UCSD Academic Integrity Coordinator and the Dean of the student's college. Confirmed cases of academic dishonesty will result in the student receiving an F as their final grade and other disciplinary actions determined appropriate by the Academic Integrity Coordinator.

TENTATIVE SCHEDULE FOR SEMINARS AND READING MATERIAL

Week	Day	Date	Topic
1	Thursday	April 1	Lecture Overview
2	Thursday	April 8	Demo Presentation by Enfu Hui
3	Thursday	April 15	Visualization of "Signaling Hotspots" in Immune Cells.
4	Thursday	April 22	How T cells Fire Their Bullets.
5	Thursday	April 29	Reconstruction of an Entire Signaling Pathway In a Test Tube
6	Thursday	May 6	Universal CAR-T Cells for Versatile Tumor Killing

7	Thursday	May 13	Tuning Cytokine Response via Ligand Engineering
8	Thursday	May 20	Chromatin Organization Driven by Phase Separation
9	Thursday	May 27	ALS Causing Mutation Causes Proteins to Form Gels
10	Thursday	June 3	Drugging the “Undruggable” Ras Oncogene