BIBC 194/BGGN 280
BIOCHEMISTRY OF CELL SIGNALING
Fall 2022

Class time	Friday 9:30am-10:50am
Classroom	YORK 3010
Instructor	Enfu Hui Email: enfuhui@ucsd.edu
Office Hours	Saturday 11am-12:30pm Zoom link https://ucsd.zoom.us/j/99152275804
Course Website	https://canvas.ucsd.edu/courses/39318
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	• **September 27** 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. • **September 29**: group assignment will be posted on Canvas (https://canvas.ucsd.edu/courses/39318**).** • **September 30**: demo presentation. • **October 7**: 1st student group presentation. • For other important dates, see the Course Schedule below.

COURSE SUMMARY

Diverse 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 and from other cells. 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 in person at YORK 3010. You will be a member of a team of 3-5 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. Please do not run over time!

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.

You must wear masks during the entire class. According to the updated academic senate policy, masking is still required in indoor classes to limit the transmission of SARS-CoV-2.

https://returntolearn.ucsd.edu/campus-guidelines/masking-and-operations/index.html

Please note that this syllabus is subject to change. Any changes will be posted on the course website. Make sure to frequently check the website to keep updated**.**

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 email your finalized PPT to Dr. Hui before the class and bring it on a memory stick to 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.

Presenters should arrive 15 min before the class start time to set your presentation up.

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).

To ensure that your emails are read and responded, please make sure that the subject line of your email includes "**BIBC 194/BGGN 280**".

GRADING:

There will be NO final exam. 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. Submission of audience peer evaluations

You can earn up to 99 points for the course. Below is a breakdown:

1. **Oral presentation of the assigned paper** (**60 pts** = 45 pts from peer audience evaluation + 5 pts from teammate evaluation, 10 pts from professor evaluation)**:**
    - **Audience peer evaluation (45 pts**). Your peers in the audience will submit a *Peer Audience Evaluation Form* with via canvas to evaluate your presentation. The form asks you to evaluate nine aspect of the presentation on a scale 1 to 5. Every member of the team will share the *same* credit.
    - **Teammate peer evaluation** (**5 pts**) will be based on teammates' evaluation. Your teammates will evaluate your presentation and preparation on a scale 1 to 5. The

average value will be your credit in this category. This credit will likely *vary* for members in the same team.

- **Professor evaluation** (**10 pts**). At the conclusion of the course Professor Hui will assign up to 10 points credit based on your quality of presentation, the effort during the preparation stage and your course citizenship. This credit will likely *vary* for members in the same team.

2. **In-class questions** (**32 pts** = 24 pts for participation + 8 pts for correctness). There will be a total 18 multiple-choice questions for the entire course, two per lecture (except the first week). The first question will typically be given 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 question, you will earn 1.5 points for participation.
   - If you submit the correct response for a question, you will earn 2 points (0.5 point for correctness).
   - If you do not submit a response, you will earn 0 point for the question.

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

Letter grades will be assigned as follows:

87-99: A
77-86: B
67-76: C
57-66: D
Below 57: 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

Week	Day	Date	Topic	Keywords
0	Friday	Sep 23	Lecture Overview	
1	Friday	Sep 30	Demo Presentation by Isaac Chang	
2	Friday	Oct 7	Visualization of "Signaling Hotspots" in T Cells.	Microscopy, immunology, signal transduction
3	Friday	Oct 14	How T cells Fire Their Bullets	Microscopy heavy, immunology, cell biology
4	Friday	Oct 21	Reconstruction of an Entire Signaling Pathway in a Test Tube	Protein biochemistry, lipid membranes, microscopy, signal transduction, phase separation
5	Friday	Oct 28	Reprograming T Cells for More Efficient Tumor Killing	CAR-T therapy, Immunology, biochemistry, flow cytometry, signal transduction, tumor models
6	Friday	Nov 4	Discovery of a novel immune checkpoint and its application in cancer immunotherapy	Immunology, flow cytometry, protein engineering, directed evolution, tumor models
7	Friday	Nov 11	Chromatin Organization Driven by Phase Separation	Phase separation, DNA structure, chromatin, biophysics, microscopy
8	Friday	Nov 18	ALS Causing Mutation Causes Proteins to Form Gels	ALS disease, phase separation, microscopy, biochemistry, cell biology
9	No classes due to Thanksgiving			
10	Friday	Dec 2	Drugging the "Undruggable" Ras Oncogene	Targeted therapy of cancer, signal transduction, GTPase, protein structure, chemistry