BIBC 194/BGGN 280
BIOCHEMISTRY OF CELL SIGNALING
Winter 2022

Class time and zoom link	Friday 9:30am-10:50am https://ucsd.zoom.us/j/92040784365 Meeting ID: 920 4078 4365
Classroom	TATA 3201 if in person
Instructor	Enfu Hui Email: enfuhui@ucsd.edu
Office Hours	11am Saturday Join URL: https://ucsd.zoom.us/j/99344305110 Zoom meeting ID: 993 4430 5110
Course Website	https://canvas.ucsd.edu/courses/32358
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	• **January 11** 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. • **January 13**: group assignment will be posted on Canvas (https://canvas.ucsd.edu/courses/24783**).** First group will present on January 21. • 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 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. 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 recent surge of the Omicron variant of SARS-COV-2 and the prediction by CDC of a large number of positive cases in the following weeks, UC San Diego is exercising caution and moving our instruction to a remote-only mode from Jan. 3 to Jan. 31. Therefore, at least lectures 1-4 will be delivered remotely via zoom using the class zoom link shown on page 1, and recorded.

The format of the remaining lectures and discussion sections will be determined according to campus regulations and announced as soon as the decision has been made.

If the remaining lectures are delivered entirely remotely, the presenting group will be presenting the PPT from their own computers and share the screen with the entire class. The presenters must have their camera ON during the presentation.

If the remaining lectures take place in person, the presenting group will be presenting the seminar in TATA 3201 in front of the remaining class, and simultaneously run a zoom meeting to accommodate audience who cannot attend in person. In this latter scenario, each audience must bring a laptop or a tablet to each in-person seminar, to answer in-class polling questions.

Please note that this syllabus is subject to change, particularly because of campus efforts to contain covid-19. Any schedule 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.

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).

Professor Hui is teaching two courses in this quarter, to help efficient communication, 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 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:

- **Audience peer evaluation (45 pts**, or 75% of the 60 pts). Your peers in the audience will submit a *Peer Evaluation Form* via canvas to evaluate your presentation. See template grading rubrics. Every member of the team will share the *same* credit.
- **Teammate peer evaluation** (5 pts, or 8.3% of the 60 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, or 16.6% of the 60 pts). At the conclusion of the course Professor Hui will assign up to 10 points credit based on the effort you put in and the effectiveness of your parts of presentation. This credit will likely *vary* for members in the same team.

2. **In-class polling questions** (**32 pts** = 24 pts for participation + 8 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 question.

3. **Audience peer evaluation** (**7 pts**): for each seminar that you are not presenting, you are asked to submit a *Audience 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:

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 AND READING MATERIAL

Week	Day	Date	Topic
1	Friday	January 7	Lecture Overview
2	Friday	January 14	Demo Presentation by Enfu Hui
3	Friday	January 21	Visualization of "Signaling Hotspots" in T Cells.
4	Friday	January 28	How T cells Fire Their Bullets
5	Friday	February 4	Reconstruction of an Entire Signaling Pathway In a Test Tube
6	Friday	February 11	Reprograming T Cells for More Efficient Tumor Killing
7	Friday	February 18	Discovery of a novel immune checkpoint and its application in cancer immunotherapy
8	Friday	February 25	Chromatin Organization Driven by Phase Separation
9	Friday	March 4	ALS Causing Mutation Causes Proteins to Form Gels
10	Friday	March 11	Drugging the "Undruggable" Ras Oncogene