BIBC194 ~ BIOCHEMISTRY OF CELL SIGNALING
Fall 2019

Class Time and Location	Tuesdays 9:30am-10:50am York 3010
Instructor	Enfu Hui enfuhui@ucsd.edu Pacific Hall 2222A
Office Hours	3-4 pm, Friday Pacific Hall 2222A
Course Website	ted.ucsd.edu
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	• **October 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. • **October 7**: group assignment will be posted on 'TED' (http://ted.ucsd.edu**).** First group will present on October 16. • 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 processed inside the cell, and how can we 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 3-4 students. Each group will be assigned for 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.

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 that 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 caveat 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”.

OFFICE HOURS: Professor Hui’s office hours will be held in his office, PH 2222A on 3-4 pm, Friday.

GRADING:

Your performance in the course will be evaluated based on three aspects:
- Presentation of the assigned paper (45%), half of the points will be calculated by based on **Peer Evaluation**.
- Quizzes (45%)
- Participation (10%)

Oral Presentation Grade: 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, etc. Please refer to the **Peer Evaluation Form** for grading rubrics.

Quizzes: There will be nine quizzes, one every week (except the first week) at the end of each paper presentation. They will consist of 1-2 multiple choice or short answer questions on the paper presented. Questions will be related to paper presented. Each quiz will account for 5 % of your grade. Please bring a pen with you.

Participation: Questions, comments, suggestions are encouraged at any time during the presentation.

Letter grades will be assigned as follows:
90-100: A
80-90: B
70-80: C
60-70: D
Below 60: F

The grading will be normalized to the highest score.

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	Tuesday	October 1	Lecture Overview
2	Tuesday	October 8	Demo Presentation: How does an antigen trigger your soldier cells?
3	Tuesday	October 15	A close-up view of the molecular handshake between the T cell receptor and an antigen complex
4	Tuesday	October 22	Visualization of “signaling hotspots” in immune cells
5	Tuesday	October 28	Reconstruction of an entire signaling pathway in *vitro*
6	Tuesday	November 4	ALS causing mutation causes proteins to form gels
7	Tuesday	November 11	A basic research that led to an anti-cancer drug
8	Tuesday	November 18	Molecular Anatomy of a Trafficking Organelle
9	Tuesday	November 25	Size Matters for the “Big Eater” Cells
10	Tuesday	December 2	Reprogramming Signaling to Direct T cells for Tumor Killing