# BIBC 194/BGGN 280
# BIOCHEMISTRY OF CELL SIGNALING
# Winter 2024

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| **Class time** | Friday 9:30am-10:50am |
| **Classroom** | York 3010 |
| **iClicker join link** | https://join.iclicker.com/HFBN |
| **Instructor** | Enfu Hui<br>Email: enfu.hui@gmail.com |
| **Office Hours** | 11am Saturday<br>Join URL:<br>Zoom meeting ID: |
| **Course Website** | https://canvas.ucsd.edu/courses/51445 |
| **Text book** | Not needed. 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 16** or earlier: email me (enfu.hui@gmail.com) 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 not among the first 4 to indicate it as the 1st choice, and you will likely get your 2nd or 3rd choice. If you never email me about your preferences, then you will be randomly assigned.<br>• **January 18**: group assignment will be posted on Canvas (https://canvas.ucsd.edu/courses/51445**).**<br>• **January 26**: first student group will present.<br>• For other important dates, see the Course Schedule below. |

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

## 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 should collaborate to synthesize a cohesive presentation, and each member should present some portion of the presentation. EACH presenter must be able to clearly explain ANY part of the assigned paper.

Each Friday, a presenting group will deliver their seminar to the remaining class in York 3010. During the presentation, they will also administer two iClicker questions to check the understanding of the audience. After the presentation, each member of the presenting group will submit a "teammate evaluation form" (template provided on Canvas) to rate the performance of each teammate, self-excluded.

As an audience, each student should bring an iClicker to the classroom to answer the in-class questions, two per lecture. In addition, each audience should also submit an "Audience evaluation form" (template provided on Canvas) to rate the quality of the presentation.

As the instructor, I will challenge you with cutting edge primary research articles, and help you develop enhance skills in reading, critical thinking and oral presentation. I'm fully committed to helping you succeed in this course. I will meet with you a week before your presentation, address your confusions and provide guidelines for you to prepare the seminar.

Please email your finalized PPT to me 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 my PC laptop for the presentation.

If you have questions, feel free to contact me by email (enfu.hui@gmail.com), to help efficient communication, please make sure that the subject line of your email includes "**BIBC 194/BGGN 280**".

**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.

**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?

**GRADING:**

**There will be NO final exam. Your performance in the course will be evaluated based on four aspects:**

1. Oral presentation of the assigned paper (50 pts)
2. In-class iClicker questions (32 pts)
3. Submission of audience peer evaluations (7 pts)
4. Professionalism/course citizenship (10 pts)

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

1. **Oral presentation of the assigned paper** (**50 pts** = 45 pts from peer evaluation + 5 pts from teammate evaluation)**:** Your presentation will be graded based on the insight your demonstrated, the clarity of the presentation, the quality of your slides, the effectiveness of your QA session and the perception of your teammates on your performance. This section will be evaluated by your peer audience and your teammates.
    - **Audience peer evaluation** (45 pts). Your peers in the audience will submit an ***Audience 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) 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.

2. **In-class iClicker questions** (**32 pts** = 24 pts for participation + 8 pts for correctness). There will be a total 18 multiple-choice iClicker questions for the entire course, two per lecture (except the first week). The first question will typically take place within 10 minutes of the starting time, to check very basic facts of the paper. The second question 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. **Submission of audience peer evaluation** (**7 pts**): for each seminar that you are not presenting, you are asked to submit an *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 credit.

4. **Professionalism/course citizenship** (10 pts). At the conclusion of the course Professor Hui will assign up to 10 points credit evaluating your performance/professionalism/course citizenship from his perspective based on the form below. This credit will likely *vary* for members in the same team.

| **Evaluation item and credit amount** | **Credit received** |
|---|---|
| Preparedness for the office hour (1 pt) | |
| Effort in preparing the slides (1 pt) | |
| Quality of the final slides (1 pt) | |
| Clarity of the oral presentation (1 pt) | |
| Understanding of the paper content (1 pt) | |
| Effectiveness in answering audience questions (1 pt) | |
| Inquisitiveness as an audience (1 pt) | |
| Quality of your audience evaluation reports (1 pt) | |
| Quality of your teammate evaluation report (1 pt) | |
| Punctuality (1 pt) | |

**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.

**LETTERS OF RECOMMENDATION**:

The format of this class will allow me to know you reasonably well at the conclusion of the course, therefore if needed, I'd be happy to provide you with a letter of reference based on your performance in this class.

**SCHEDULE FOR SEMINARS AND READING MATERIAL**

**The following topics will likely to be covered in this course, though the sequence has not been decided. Please do not send me your preference list until after the 1st lecture on January 12.**

Visualization of “Signaling Hotspots” in T Cells

Reconstruction of an Entire Signaling Pathway In a Test Tube

Discovery of a novel immune checkpoint and its application in cancer immunotherapy

Engineered skin bacteria helps T cells to fight tumors

Reprograming T Cells for More Efficient Tumor Killing

Chromatin Organization Driven by Phase Separation

ALS Causing Mutation Causes Proteins to Form Gels

Drugging the “Undruggable” Ras Oncogene

| Week | Day | Date | Topic |
|---|---|---|---|
| 1 | Friday | January 12 | Lecture Overview |
| 2 | Friday | January 19 | Demo Presentation |
| 3 | Friday | January 26 | TBA |
| 4 | Friday | February 2 | TBA |
| 5 | Friday | February 9 | TBA |
| 6 | Friday | February 16 | TBA |
| 7 | Friday | February 23 | TBA |
| 8 | Friday | March 1 | TBA |
| 9 | Friday | March 8 | TBA |
| 10 | Friday | March 15 | TBA |