

定量細胞生物學 (Quantitative Cell Biology, LSMM624300)
Wednesdays W7W8

Instructor:

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Office Location: Life Science Building I, Room 527

Office Hours: By appointment

Course Description:

The Quantitative Cell Biology will explore how the insights of quantitative tools have illuminated the complex phenomena of cells. Our goal is to provide a multidisciplinary forum to discuss the integration of molecular biology and systems biology. It allows undergraduates and graduate students a chance to meet every week in a relaxed setting to discuss journal articles and current research. We hope everyone takes advantage of this opportunity, as it is a great way to practice speaking in front of a diverse group, critically analyze papers, and be aware of the state-of-the-art advances in cancer research. This course requires no previous knowledge, but does assume competency in one sub-field of biology or engineering. The idea is that students will need to work hard in the fields they are not familiar with, and help one another when someone needs help.

Course Requirements and Expectations:

There is no textbook for this course. The required readings are scientific articles, which are available as PDF files in the course website (iLMS). Students are required to read papers before class starts and come prepared for discussion. Expect to spend a minimum of ninety minutes reading per paper.

Grading:

Course grades will be determined as follows:

1. Lectures:

Participation (asking/answering questions and joining in discussion) **50%**

- If you read the paper(s) before each class, you will be prepared for class, discussions will be more meaningful, and learning will increase.
- Asking/answering questions and joining in discussions are important skills in the graduate training and beyond. You will receive marks for participation and part of this mark reflects how active you have been in discussions.
- Each student will be required to ask/answer at least 1 question in class every week (**40 points**)
- Outstanding participation (multiple insightful questions or comments) would be greatly appreciated. (**10 points**)

2. Journal clubs: student-led discussions **50%**

- I will assign one or two students to lead each journal club and two or three

- supporters at random to present figures.
- The assigned leaders will pick an article on a topic that they find interesting from the given literature list, provide information (the background of the study, the paper's methods, etc.), coordinate supporters, and assist the audience in joining the discussion.
- Each student will serve as discussion leader, supporter, and audience. The audience is expected to ask/answer at least 1 question in class. **(35 points)**
- Outstanding participation would be greatly appreciated. **(15 points)**

To prepare a successful journal club presentation, it helps to mirror the structure of the article as follows:

1. Background: Describing the background of the study, prior literature, and the question the paper was intended to address.
2. Methods: Review the paper's methods, emphasizing the study design, analysis, and other key points that address the validity and generalizability of the results.
3. Results: Discuss the results, focusing on the figures.
4. Discussion: Summarize the key findings. Addressing the questions that remain unanswered and potential next steps.

Schedule:

09/12 – Lecture 1: How to read and present a research paper.

09/19 – Lecture 2: How cells transduce extracellular matrix (ECM) properties into morphogenetic behaviors.

09/26 – Lecture 3: How cancer cells enter dormancy.

10/03 – Lecture 4: The possibility of non-genetic rare cell variability.

10/10 – 放假 (國慶日)

10/17 – Lecture 5: How cell-to-cell variations are linked with cell-fate decisions.

10/24 – Lecture 6: The integration of molecular biology and systems biology: How gene expression is controlled by complex stimuli.

10/31 – Lecture 7: The integration of molecular biology and systems biology: How relationships between signaling network components are influenced by biological context.

11/07 – Lecture 8: The most indispensable tool in cell signaling research: Immunoblot.

11/14 – 停課 (全校運動大會)

11/21 – Journal club 1:

11/28 – Journal club 2:

12/05 – Journal club 3:

12/12 – Journal club 4:
12/19 – Journal club 5:
12/26 – Journal club 6:
01/02 – Journal club 7:
01/09 – 停課 (期末考週)