Spring 2021
Advanced Cell Biology:
MCB 5280

Instructor: Dr. Juliet Lee
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Office hours: Online by appointment

Credits: 3
Preferred prerequisites: MCB2210 or equivalent undergraduate cell biology course.
When: Tues. and Thurs. 9:30 – 10:45 AM
Where: Online via Webex and on occasion Blackboard Learn (Blackboard Collaborate Ultra)
Course materials are posted on HuskyCT
No textbook required: Cost $0. Although no textbook is required it is recommended that you read relevant sections of any major cell biology text book, e.g. Molecular Cell Biology (Lodish et. al.) 5th Edition, if you need to review background material. This and other books can be borrowed from the library or I could loan you one, if no more than 2-3 people need them.

Important notice.
The University of Connecticut is required to verify the identity of students who participate in distance learning or online courses and to establish that students who register in these courses are the same students who participate in and complete the course activities and assessments and receive academic credit. Verification and authentication of student identity in this course will include: 1. the use HuskyCT as the primary repository and access point for course content and assessment, 2. synchronous virtual class periods, and 3. confirm identity using the official UConn photo in StudentAdmin.

Course description:
The main focus of this course is the dynamic nature of the cytoskeleton and its role in normal and abnormal cell behavior. The course consists of four related topics beginning with the structure-function relationship between cytoskeletal subunits and the dynamics of actin filaments and microtubules. In the next topic we examine the spatiotemporal organization of cytoskeletal function, using cell motility as an example. We then explore how signaling between cells and the extracellular matrix regulates cell functions, such as motility and growth. Specifically, we will focus on the importance of cell-substrate adhesions in the integration of biochemical and mechanical signals (mechanosensing). Lastly, we examine how aberrant signaling contributes to metastasis, in the context of the regulation of cell motility and cell-cell interactions.

Course goals:
- To understand how the cytoskeleton integrates cell function across multiple size scales from the molecular, cellular, tissue and organismal levels.

- To understand how cells sense and respond to the biochemical and mechanical properties of their environment.
- To learn about the techniques used to study the subjects described above.
- To become familiar with key research papers (including old classics) in the field of the cytoskeleton and cell motility.
- To acquire a historical perspective on how our understanding of cytoskeletal function has evolved over time.

Organization of class periods.
These consist of two ~ 60 min periods per week. Class format may be one of two types: a) short lecture (~ 30 min.) followed by a workgroup problem solving session ~35 min. or b) a single period (~ 60 min) for an "in class" paper presentation including a discussion session

Exams.
There will be one mid-term exam and one "take home" final. The mid-term exam is in 2 parts, 1a and 1b. Part 1a consists of 3 problem style questions to be taken during class time. Note that I may use the Respondus lockdown monitor during this "in-class" exam. 1b consists of 3 short answer "take home" questions. The final exam consists of two essay style questions (~4 typed pages, for EACH question, excluding figures or references).

Grading:
Workgroup problem sets* (~5) and in-class presentation of papers = 30% of your final grade. The mid-term and final exam = 70% of your final grade. Attendance is important. For each unexcused absence 1 percentage point will be subtracted from your final score.

Tentative schedule:

Part I: Weeks 1- 4

<u>The relationship between molecular structure and dynamics</u>

- Dynamic behavior of actin filaments and microtubules *in vitro*.
- The function of treadmilling (actin) and dynamic instability (microtubules) *in vivo.*
- The role of actin binding proteins in the regulation of actin filament dynamics.

Part 1: Weeks 5- 7

<u>Temporal and spatial organization of cytoskeletal function</u>

- Force generation by the actin cytoskeleton and its role in cell motility.
- The role of microtubules, microtubule associated proteins (MAPs) in the development of cell polarity.
- Crosstalk between actin and microtubules.

Exam 1a: Thursday, March 11th (in class)
Exam 1b: assigned March 11th (Take home)
Exam 1b due Friday March 19th

Part 2: Weeks 8-10

Signaling between the cell and extracellular matrix

- Cell adhesions as dynamic multi-molecular signaling complexes.
- The role of mechanosensing in the regulation of cell function e.g. motility, growth, differentiation and metastatis.

SPRING BREAK – April 11th – 17th

Part 2: Weeks 11-14

The cytoskeleton in health and disease

- The development of metastatic cancer: Defective signaling in the loss of growth control, motility, and aberrant interactions of cancer cells with host tissues.
- Role of tumor-associated macrophages in metastasis.

Exam for Part 2: Thursday April 29th (take home) -- last class

Exam answers and all problem sets due by NOON on Friday, May 7th.

DISABILITIES

Any student with disabilities that he/she would like the faculty to be aware of should communicate that information in confidence to the faculty and any issues arising will be addressed in accordance with the policy of the University.

ACADEMIC MISCONDUCT STATEMENT:

"Academic misconduct in any form is in violation of the University of Connecticut Student Conduct Code and will not be tolerated. This includes, but is not limited to copying or sharing answers on tests or assignments, plagiarism, and having someone else do your academic work. Depending on the act, a student could receive an F grade on the test/assignment, F grade for the course, or could be suspended or expelled."

Policy on Plagiarism

Plagiarizing is defined as "**To steal and pass off (the ideas or words of another) as one's own: use (another's production) without crediting the source"**(www.Merrian-Webster.com, 2005)

Plagiarism violates the Academic Misconduct section of "The Student Code" of the University of Connecticut (http://web.uconn.edu/mcb201/misconduct.html) and will not be tolerated in MCB courses. The instructors of MCB 241W will adhere to the guidelines laid out in "The Student Code"; therefore, students should read and understand these policies and the consequence of violations.

The definition of plagiarism extends to all aspects of evaluated work in this course. **Copying another student's work is plagiarism. Failure to give full and proper citation to other people's work is plagiarism.** Full and proper citation includes putting quotation marks around any quoted passage, including a correct citation to the publication from where the ideas originated and a complete reference to that publication in the "literature cited" section. This applies to all forms of communication including websites or personal communication from someone, such as would occur in verbal discussions of scientific data. Direct quotations are appropriate when the original statements would lose clarity or intent. However, your assignment should not include multiple direct quotations. **Paraphrasing of other authors' work is acceptable given that the ideas contained in the paraphrased passage are properly attributed to the author and the ideas are re-worded into the student's own original language.**

Special note.
In this class it counts as plagiarism if you have "lifted text" from someone else's paper or another source, such as an assigned paper, an online source, or your own written work from another course.

There are many resources available to students:
PLEASE COMPLETE THE PLAGIARISM MODULE IN HUSKYCT.
Should you need additional information the following web sites may be of help:
http://www.lib.uconn.edu/using/tutorials/LILT/plagiarism.htm
http://owl.english.purdue.edu/handouts/print/research/r_plagiar.html

The penalties for copying another student's work are:

1. A "0" for the entire assignment.