

Course Syllabus
MCB 200A/B
Fundamentals of Molecular and Cell Biology
Fall Semester, 2016

Class Meetings: Monday-Friday 9:00-11:00
Location 125 LKS

Course Professors:

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Course Description:

The goal of this course is to provide graduate-level instruction on molecular and cellular biosciences from a highly integrated systems perspective. A collection of approaches, and a focus on critical thinking and problem solving, will be used to show how fundamental, highly significant biological problems are "cracked open." Reading will be assigned from a mix of classic and current peer-reviewed papers selected by the instructors.

What this course aims to achieve:

- to provide exposure to the full breadth of research areas in Molecular and Cell Biology
- to provide enough depth to allow any graduate student to attend and understand any seminar in MCB
- to present material in a conceptual and integrated way that makes connections between apparently disparate research areas
- to demonstrate how an understanding of fundamental molecular and cell biological mechanisms is essential for understanding complex biological systems
- to interest students in research areas they may have not previously considered for their thesis work
- to cover material at the level of sophistication appropriate for a graduate level course, including a discussion of the experimental basis for what is being learned
- to equip students to approach the questions of 21st century biology
- to emphasize the value of basic research for addressing problems of human health and disease
- to emphasize the importance of clear and critical writing in biological research
- to teach students how to critically read and evaluate the primary literature
- to help prepare students for qualifying exams
- to ensure that students have the appropriate quantitative training to pursue cutting-edge research
- to help students become comfortable with asking questions during lectures and discussing science in a group setting

What this course does not aim to achieve:

- to provide a comprehensive coverage of every important topic within each area of MCB (this can be achieved in the Advanced Topics classes in the Spring)
- to provide remedial undergraduate-level training. Necessary background will be covered rapidly and it is expected that every student will have some areas where they will need to refresh or establish their mastery of the fundamentals.

- to provide a sequence of modules on each research area within MCB

Lectures:

While the instructors will typically use Powerpoint or white board presentations during the lectures, we will not distribute the files before class. Moreover, no computers, cell phones or other electronic devices are allowed to be on during class. Please bring a pen and paper for taking notes in class. Please note that the instructors plan on entertaining numerous questions from the audience and that part of your grade will be based on in-class participation in these questions/answers/discussions. Also, please spread yourselves out in the room and do not congregate in the last two rows of the lecture hall.

Course Grading:

Grading will be based on attendance, problem sets, class participation, and presentations during the course.

The breakdown is:

25% problem sets

25% participation in discussion sections and in lectures

25% classic paper and Nobel prize in-class presentations

25% final exam – take home (this will involve six experimental design and analysis questions; one from each professor on the material they taught)

Note that at UC, Berkeley for graduate courses, only a grade of B or above is considered passing.

“OFFICE HOURS” AND WHERE TO GO FOR HELP:

This class is an adventure for all of us. We are all in it together. All six instructors try to attend and participate every day. If you have questions, please feel free to find us during breaks or just before/after class. We are also available by appointment. Our experience has told us that if you are confused, others are likely also confused. Do not hesitate to ask questions in lecture – you will notice that we will ask questions as well. What makes sense and is obvious to a geneticist may be totally confusing to a structural biologist or neurobiologist. This class works under the ‘Las Vegas Rule’ – what happens in the classroom stays in the classroom!

DISCUSSION SECTION PAPERS:

There are 6 discussion sections, representing papers that are or might be a paper from the divisional QE papers. The discussion sections will be in small groups scheduled on Friday mornings with one of the 6 course professors. Everyone is expected to have read the paper before coming to the group discussion. The methods and logic of the paper will be discussed in detail during the discussion period. Everyone is expected to participate in the discussions, either by asking or answering questions or describing the data/experiments/figures in paper.

There will be discussion sections on: 10/7; 10/14; 10/21; 10/28; 11/4 and 11/10. The precise time and place of these discussions will be determined by each group and the relevant faculty member. If a

faculty member is away for one of the Friday paper discussion sessions, then it will be rescheduled at a time that is suitable for all students in that group.

CLASSIC PAPER PRESENTATIONS:

During the first month of class, students will be assigned to groups that will prepare and present a 15 min. presentation (actually 15 min. + 3 min. for questions and 2 min. for feedback) synopsis and critique of a classic paper in the field. Details on how to prepare the presentation will be discussed in class.

NOBEL PRIZE WEEK:

During this week (first week of October), your working group will select and present the science that resulted in a Nobel Prize from the uploaded list (Each one of the 7 groups needs to select a different prize from the list of about 25). You should read the Nobel Prize lectures by the prizewinners and then with some background reading, your group should prepare a 10 min. presentation for a non-specialist audience explaining what their discovery was that led them to be awarded a Nobel Prize. You can present the information you assemble in person using slides, a pre-recorded YouTube-type video, a chalk talk or a skit.

STUDENT MICRO-SYMPOSIUM (SMS)

At the end of the semester, during RRR week, you will each present a short research talk on your rotation research in front of the class. The presentation length will be 10 min. + 3 min. for questions. You will receive instructor feedback on these research talks online.

READING ASSIGNMENTS:

Recommended reading to accompany the lectures will be assigned on a per lecture basis. For each lecture, we will often provide an overview/or review of the basic material to be covered, as well as a research article from primary literature. We will try to annotate these readings and let you know how to focus your efforts. The class has diverse backgrounds and interests –for some, the overview literature may be challenging enough.

Because the class is so diverse, with different backgrounds from undergraduate studies, it might be necessary for you to consult a textbook on the lecture material. Below are some common textbooks related to the broad topics that will be covered in the class. You should feel free to read these as background/refreshers for the topics covered in the lectures.

Reference Texts for MCB200AB Fall 2016

The Molecules of Life: Physical and Chemical Principles

Jul 31, 2012

by John Kuriyan and Boyana Konforti

ISBN-13: 978-0815341888

ISBN-10: 0815341881

Molecular Biology of the Gene (7th Edition)

Mar 2, 2013

by James D. Watson and Tania A. Baker

ISBN-13: 978-0321762436

ISBN-10: 0321762436

Lehninger Principles of Biochemistry

Nov 21, 2012

by David L. Nelson and Michael M. Cox

ISBN-13: 978-1429234146

ISBN-10: 1429234148

Biochemistry

Apr 8, 2015

by Jeremy M. Berg and John L. Tymoczko

ISBN-13: 978-1464126109

ISBN-10: 1464126100

Molecular Biology of the Cell

Nov 18, 2014

by Bruce Alberts and Alexander Johnson

ISBN-10: 0815344325

ISBN-13: 978-0815344322

Janeway's Immunobiology

Mar 22, 2016

by Kenneth Murphy and Casey Weaver

ISBN-13: 978-0815345053

ISBN-10: 0815345054

Principles of Neural Science, Fifth Edition (Principles of Neural Science (Kandel))

Oct 26, 2012

by Eric R. Kandel and James H. Schwartz

ISBN-13: 978-0071390118

ISBN-10: 0071390111

Genetics: From Genes to Genomes, 5th edition

Sep 5, 2014

by Leland H. Hartwell and Michael L. Goldberg

ISBN-13: 978-0073525310

ISBN-10: 0073525316

PROBLEM SETS/GRADING:

The material for each lecture or related set of lectures will also include problems for your review and solution. These will typically be given as the weekly problem sets. At the end of each week, the required problems from the week will be collated and posted as a problem set that is due on the specified dates. Students are encouraged to discuss the problems with each other. However, it is assumed that what the students hand in will be the results of their own writing. Direct copying of answers is not allowed. The problem sets will be graded and an answer key will be available online. For one of the later problem sets, we may ask the student groups to grade a problem set, as practice for their role as teaching assistants in years 2 & 3. There may or may not be problems from the guest lecturers. If so, they will be integrated into the weekly problem sets.

CODE OF CONDUCT:

The following is based on material provided by the Campus to be distributed to students at the beginning of the academic year:

The student community at UC Berkeley has adopted the following Honor Code:

“As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others.”
The hope and expectation is that you will adhere to this code.

Collaboration and Independence:

Reviewing lecture and reading materials and studying for exams can be enjoyable and enriching things to do with fellow students. This is recommended. Students are encouraged to discuss homework problems with each other; however, it is assumed that what the students hand in will be the results of their own writing. Direct copying of answers is highly discouraged.

Cheating:

A good lifetime strategy is always to act in such a way that no one would ever imagine that you would even consider cheating. Anyone caught cheating will also be reported to the University Center for Student Conduct.

Plagiarism:

To copy text or ideas from another source without appropriate reference is plagiarism and will result in a failing grade for your assignment and usually further disciplinary action. For additional information on plagiarism and how to avoid it, see, for example:
<http://gsi.berkeley.edu/teachingguide/misconduct/prevent-plag.html>

Academic Integrity and Ethics:

Cheating on exams and plagiarism are two common examples of dishonest, unethical behavior. Honesty and integrity are of great importance in all facets of life. They help to build a sense of self-confidence, and are key to building trust within relationships, whether personal or professional. There is no tolerance for dishonesty in the academic world, for it undermines what we are dedicated to doing – furthering knowledge for the benefit of humanity.

Your experience as a student at UC Berkeley is hopefully fueled by passion for learning and replete with fulfilling activities. And we also appreciate that being a student may be stressful. There may be times when there is temptation to engage in some kind of cheating in order to improve a grade or otherwise advance your career. This could be as blatant as having someone else sit for you in an exam, or submitting a written assignment that has been copied from another source. And it could be as subtle as glancing at a fellow student's exam when you are unsure of an answer to a question and are looking for some confirmation. One might do any of these things and potentially not get caught. However, if you cheat, no matter how much you may have learned in this class, you have failed to learn perhaps the most important lesson of all.