

Molecular Cell Biology (Bio 5068)

Syllabus for 2007

Updated: August 28, 2007

Lectures: Tuesday and Thursday, 8:30 - 10:00 AM, Holden Auditorium, Farrell LTC.

Discussion section: Wednesday, 3 - 4 PM.

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Web site: www.cellbiology.wustl.edu/teaching.htm. Go to Teaching, then Bio5068 - MCB. Please sign up on the web site now, in order for us to assign you to a Discussion Section. The signup page closes at 12 noon on Tuesday, Sep 4, and we will email / post the groups by noon the next day, Wednesday, Sep 5.

Day	Date	Title	Lecturer
Thur	8/30	Introduction: Membranes, Proteins, Cells and Tissues.	Mercer
		Labor Day Weekend	
Tues	9/4	Protein Dynamics and Interactions.	Sept
Wed	9/5	Discussion section #1	
Thur	9/6	Cell Motility. Cytoskeleton Assembly.	Cooper
Tues	9/11	Actin-based Motility.	Cooper
Wed	9/12	Discussion section #2	
Thur	9/13	Microtubules and their Motors. Intermediate Filaments.	Cooper
Tues	9/18	Cellular Compartmentalization. Nuclear Transport.	Linder
Wed	9/19	Discussion section #3	
Thur	9/20	Protein Targeting to Membranes. Protein Translocation into the ER.	Linder
Tues	9/25	Protein Processing and Quality Control in the ER	Linder
Wed	9/26	Discussion section #4	
Thurs	9/27	Protein Purification	Linder
Tues	10/2	Exam 1. Mercer, Sept, Cooper, Linder. In-class. Take-home given out.	
Wed	10/3	No Discussion Section.	
Thur	10/4	Exam 1: Take-home due before class. Lecture: Secretion, with Fusion.	Hanson
Tues	10/9	The Endocytic System, with Lysosomal Targeting.	Hanson
Wed	10/10	Discussion section #5	
Thur	10/11	Membrane Transport	Mercer
Tues	10/16	Kinetic Analysis	Hanson
Wed	10/17	Discussion section #6	
Thur	10/18	Receptor-gated Channels	Nichols
Tues	10/23	Voltage-gated Channels	Nichols
Wed	10/24	Discussion section #7	
Thur	10/25	Cell Junctions / Epithelial Cell Biology / Cell Polarity	Mercer

Tues	10/30	Exam 2: Hanson, Mercer, Nichols. In-class.	
Wed	10/31	No Discussion section.	
Thur	11/1	Exam 2, Take-home due before class. Lecture: Signaling throughout Evolution.	Baranski
Tues	11/6	Ras and Receptor Tyrosine Kinases	Baranski
Wed	11/7	Discussion section #8	
Thurs	11/8	Signal Transduction by G proteins	Baranski
Tues	11/13	Signaling in Development	Baranski
Wed	11/14	Discussion section #9	
Thur	11/15	NMR	Hall
Tues	11/20	Cell Cycle I	Piwnica-Worms
Wed	11/21	No Discussion Section - Thanksgiving	
Thur	11/22	Thanksgiving	
Tues	11/27	Cell Cycle II	Piwnica-Worms
Wed	11/28	Discussion section #10	
Thur	11/29	Cell Cycle III	Piwnica-Worms
Tues	12/4	Apoptosis	Schlesinger
Wed	12/5	Discussion section #11	
Thur	12/6	Structural Biology: X-ray Crystallography	Fremont
		ASCB Meeting: Dec 1-5.	
Tues	12/11	Extracellular Matrix	Miner
Wed	12/12	Discussion section #12	
Thur	12/13	Cell-matrix Interactions	Miner
Tues	12/18	Exam 3: Baranski, Cistola, Piwnica-Worms, Schlesinger, Fremont, Miner. In-class.	
Wed	12/19	No Discussion section.	
Thur	12/20	Exam 3. Take-home due.	

Guidelines for Students

Our general course philosophy is to help the student become a graduate student, which means learning how to do science. We want to avoid simply covering a textbook's worth of facts in cell biology; most of the students have had cell biology material in previous courses. The lecture series is designed to emphasize how experiments are designed and interpreted, coupled with an understanding of the current status of research. The overall objective is to allow an understanding of the strategies and principles used to investigate fundamental concepts in cell biology, which we hope will be a valuable beginning to the independent research you will do as a graduate student.

The experiment-based approach is also emphasized in the exams, especially the take-home essay section, and the small group discussion sections. An important component of the course is the research tools of protein biochemistry, which are fundamental to defining molecular mechanism in cell biology.

Required Reading: No single text is required for the course, but several listed below are highly recommended as background information. You may wish to have on your desk, as a reference, a cell biology text and a biochemistry text. Each lecturer is likely to highlight background reading from these books. Lecturers will generally provide a primary literature reference list, with recent reviews and key original papers for assigned reading.

Suggestions include the following:

Cell Biology

Lodish et al., *Molecular Cell Biology*, 6th Edition, Freeman, c. 2008. Online material for Lodish includes a number of videos, animations and podcasts where the authors describe key concepts from chapters. <http://bcs.whfreeman.com/lodish6e/>

Pollard and Earnshaw, *Cell Biology*, 2nd Edition, Saunders, c. 2007. Their online material is available w/ a password from the inner cover of the textbook.

Biochemistry, General

Nelson and Cox, *Lehninger's Principles of Biochemistry*, 4th edition, Worth.

Berg, Tymoczko and Stryer. *Biochemistry*, 5th Edition.

Protein Biochemistry

Branden and Tooze, *Introduction to Protein Structure*, 2nd edition.

Fersht. *Structure and Mechanism in Protein Science : A Guide to Enzyme Catalysis and Protein Folding*. 3rd Edition.

Lesk, A. *Introduction to Protein Architecture : The Structural Biology of Proteins*.

Older editions of a number of textbooks are available free online from NCBI...

<http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=Books>

For example, Alberts et al., *Molecular Biology of the Cell*, 4th Edition, Garland. Updated fall of 2001.

<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=mboc4.TOC&depth=2>

Stryer's 5th edition is here...

<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=stryer.TOC&depth=2>

Discussion Sections: Small groups of 6 - 8 students will meet with an assigned faculty member on the designated days. Please sign up on our web page in order to give us the information we need to assign you to a group.

One paper from the original literature will be assigned for each session. Before the discussion, each student will read the paper and write a one-page critique. Students may discuss the papers with each other, but they may not write critiques together.

Students are expected to attend each session, to participate in the discussion of the paper's critique, and to hand in their critique. The grade for the discussion portion of the class will be based on critiques and class participation.

Grades: There will be three exams, each with in-class and take-home essay sections, and they will account for about 3/4 of the final grade. Exams are independent projects, and students may not work together. Performance in the Discussion Section will account for 1/4. Homework will not be graded, but answers will be posted, and TAs will discuss homework in help sessions. Homework is often representative of material on the in-class portion of the exam.

Ethics: In general, students are encouraged to seek information from any source, including books, the internet, other people in their lab, and other students. The more you learn, the better. However, that does not include the take-home portions of the exams or the writing of the critiques for discussion section.

Plagiarism is not allowed, of course, and, in this setting, that means representing another person's words or ideas as your own. Scientists constantly read what others have written, and they seek to understand other scientists' thoughts and ideas. In one's own writing, of a research paper for example, one often discusses the ideas and results of other scientists, and one credits them by citing their publications. In your work in this course, and in graduate school and scientific research in general, you may describe what others have said, but you need to cite their work appropriately, and that includes using quotation marks around another person's words, even if they are only a single sentence or phrase. In general, if you want to convince a reader that you have mastered the material, you will do better if you rephrase things in your own words.