Molecular Endocrinology MCB 135A UC Berkeley, Fall 2016

MCB 135A, 3 units
Monday, Wednesday, Friday, 9-10 AM
Room: 101 Morgan Hall

Course webpage: bcourse site

Instructor Information

Faculty Instructor: Gary Firestone
Email: glfire@berkeley.edu
Phone: 2-8319
Office Hours: TBA and may vary a bit throughout the semester
I'm always accessible by email

Graduate Student Instructors: Monika Haoui (monikahaoui@berkeley.edu)
Megan Flaviano (mflaviano@berkeley.edu)

Discussion Sections: Mondays 11-12 (3111 Etcheverry) 12-1 pm (3111 Etcheverry)
Wednesdays 10-11 AM (Hearst Field Annex B5) and 11-12 AM (215 Dwinelle)

Course Description

Prerequisites: MCB 100A or MCB 102 (biochemistry). Please see me if you have not previously taken or are not concurrently enrolled in either course. At a minimum you will need to demonstrate knowledge of key concepts in biochemistry, such as the difference between major/minor grooves of DNA and an understanding of the three-dimensional structure of proteins. In past years, students have mentioned that Bio1A provided an adequate background to understand the key topics of the course. So having taken Bio1A without MCB102 or MCB100A is OK depending on your confidence level with biochemical/cell biological concepts.

Overview of Course: This is a research-based course that focuses on experimental approaches to understanding hormone action at the molecular level. This course is not about memorizing facts and figures. Rather the emphasis is on problem solving, conceptual understanding, and critical thinking. While the content for this course is based on in-depth examination of a limited number of topics in molecular endocrinology, the approaches to studying these topics can be applied to other areas such as cell biology and immunology.

What You Will Learn in This Course: You will learn how to critique scientific papers in primary research journals, distinguish good from poor research studies, conduct a review of the literature in a particular area of interest, design valid and reliable experiments, interpret resulting data, draw appropriate conclusions, and develop new directions for future research.

Methods of Instruction: Using a combination of lecture and student participation, each class session will focus on learning the fundamentals of molecular hormone action, developing tools to design experiments and interpret results, and creating new models of hormone receptor signal transduction.

Readings: There is no required textbook. Course notes, and study questions have been compiled into a Course Manual/Reader (Can be purchased at Copy Central, 2576 Bancroft for $19.66 + taxes). As needed, primary research papers will be made available on the bcourse site and sent to you via email. A pdf file of the course reader will be available via bcourse approximately 2 or 3 weeks into the class based on when I receive the pdf file from Copy Central.

Course Requirements: Undergraduate Students

Exams: There will be two midterms (60 points and 70 points) and one final exam (150 points). All exams will be open note. The questions on the exams will involve some aspect of interpreting theoretical data from which you will be asked to design a model and then experimentally test your proposed model. Sample questions will be discussed in class. The tentative dates of the midterms are Oct 7th and Nov 4th. (9-10 AM: Room-to be determined)

The final exam is currently scheduled for Thursday, December 15th 2015 from 7 pm-10 pm. (classroom not determined).

Discussion Section Assignments: There will be six discussion section assignments that will range from 2 points to 5 points for a total of 20 points. The assignments will be to answer experimental problem solving questions, and at least two of the assignments will involve writing a short critique of a primary research paper. The paper topics will focus on steroid receptors and/or plasma membrane receptors. All of the discussion section assignments are to be submitted in hard copy at your discussion section and the due dates will be announced in class. Details about selecting research journal articles and writing the short critiques will be discussed in class and in the discussion sections.

Course Requirements: Graduate Students

Exams and Discussion Section Assignments: There will be two open note midterm exams (may be somewhat different than the undergraduate exam). The questions on the exam will provide theoretical data from which you will be asked to design a model and then experimentally test your proposed model. Sample questions will be discussed in class. The midterms will be given at the same time as the one for the undergraduates in the class. The Discussion Section Assignments are the same as described above for the Undergraduates.

Grant proposal: You will be asked to write a modified version of a postdoctoral fellowship application on a molecular endocrinology-related topic. Your application will include a critical review of the literature and proposed experiments. An outline of the grant proposal will be due during the first week in November. **The full proposal will be due on Tuesday December 13th, 2016 at "high" noon.** Specific approaches to writing the grant proposal will be discussed in class.

Grading Policies

Your grade in this course will be based on a total of 300 points. Undergraduate and graduate students will be graded independently of each other. Note: All assignments and exams must be completed to pass this class or receive a letter grade.

Undergraduate Students

Course components will be weighted as follows:

Total midterms:	**130 points (midterm #1: 60 points; midterm #2: 70 points)**
Discussion section:	**20 points**
Final Exam:	**150 points**

(Note some changes may be made in the final point totals)

Graduate Students

Course components will be weighted as follows:

Midterms:	**130 points (midterm #1: 60 points; midterm #2: 70 points)**
Discussion section	**20 points**
Grant Proposal:	**150 points**

If you find that you have any trouble keeping up with assignments or other aspects of the course, make sure you let your instructor (Gary Firestone) and/or your GSI know as early as possible. Attend Faculty and GSI office hours; bring your questions and think about those from other students.

Course Policies

Safe, Supportive, and Inclusive Environment:
Whenever a faculty member, staff member, post-doc, or GSI is responsible for the supervision of a student, a personal relationship between them of a romantic or sexual nature, even if consensual, is against university policy. Any such relationship jeopardizes the integrity of the educational process.

Although faculty and staff can act as excellent resources for students, you should be aware that they are required to report any violations of this campus policy. If you wish to have a confidential discussion on matters related to this policy, you may contact the Confidential Care Advocates on campus for support related to counseling or sensitive issues. Appointments can be made by calling (510) 642-1988.

The classroom, lab, and work place should be safe and inclusive environments for everyone. The Office for the Prevention of Harassment and Discrimination (OPHD) is responsible for ensuring the University provides an environment for faculty, staff and students that is free from discrimination and harassment on the basis of categories including race, color, national origin, age, sex, gender, gender identity, and sexual orientation. Questions or concerns? Call (510) 643-7985, email ask_ophd@berkeley.edu, or go to http://survivorsupport.berkeley.edu/.

Statement on Accommodation

If you need accommodations for any physical, psychological, or learning disability, or if you want me to have emergency medical information, please speak to me privately, either after class or during my office hours. For DSP students needing accommodations for the exams, please contact me at least two weeks prior to the midterm or final so that we can work out acceptable accommodations.

If there are any conflicts with the due dates of the exams or assignments for religious reasons, travel for campus sponsored extracurricular activities, medical and graduate school interviews, or for other reasons, please contact me.

Academic Honesty

I (Gary Firestone) expect you to do your own work and to uphold the standards of intellectual integrity. If you are having trouble with an assignment or studying for an exam, or if you are uncertain about permissible and impermissible conduct or collaboration, please come see me with your questions. UC Berkeley's cheating policy (http://bulletin.berkeley.edu/academic-policies/#studentconductappealstext) will be followed.

Incomplete Policy

Under emergency/special circumstances, students may petition me to receive an incomplete grade. Please clearly state your reasoning in your comments to me.

Letters of Recommendation:

I am quite willing to provide letters of recommendation as needed for any of your applications (such as medical and graduate school and/or job opportunities). In addition to participating in the classroom discussions, please be sure to attend several of my course office hours. Also, ask your discussion section GSI to send me a brief note about your participation in the discussion section. After the end of the course (even years later), please request an interview with me and bring a copy of your complete unofficial transcript, your CV and Personal Statement along with any recommendation forms that need to be filled in.

Additional Course Policies

- Be sure to pay close attention to deadlines.
- In consideration of other students, please turn off your cell phone during class time.
- Anyone eating in class must share their food with all other students.
- If you have a conflict with the midterm or due dates of assignments, please see me in advance.
- For unexpected emergencies, please email or phone me.
- You may discuss the general features of your discussion section assignments with other students, but the assignment that you submit must be completed on your own.

Course Topics

The topics below will be discussed in order though the amount of time devoted to each topic will vary. If new research is published relevant to course topics, the information will be discussed in class during the semester.

a. Experimental approaches to examine properties of receptor-steroid interactions, activation of receptors, and issues of receptor localization.
b. Cloning and molecular genetic analysis of functional and structural domains within steroid receptors.
c. Experimental analysis of steroid receptor-defective variants and genetic contributions to elucidate early events in steroid hormone action.
d. Steroid regulation of transcription, use of inducible egg white proteins and mouse mammary tumor virus as model systems for examining hormone regulated gene expression.
e. Steroid receptor-DNA interactions, detection of sequence-specific high affinity DNA binding sites.
f. Functional and mutagenic analysis of receptor DNA binding sites, GRE vs. ERE DNA binding sites, role of spacing and orientation.
g. Positive and negative regulation of gene expression by steroid receptor/transcription factor interactions, receptor/coactivator and receptor/corepressor interactions; heterodimer and homodimer formation of steroid receptors, formation of transcriptional complexes.
h. Relationship of steroid receptor DNA binding sites to enhancer elements and chromatin structure.
i. Biosynthesis of steroid hormones, thyroid hormones.
j. Overview of cell surface receptor structures
k. Cell surface receptor dimerization, clustering and interactions with membrane components
l. Mechanism of insulin action.
m. Protein kinase activity and molecular genetic analysis of the structural domains of insulin and EGF receptors, receptor binding proteins, SH2/SH3 domains.
n. Signal transduction by protein hormone receptors, Protein kinase cascades.
o. Transcriptional regulation by protein hormone receptor signaling and cAMP.
p. Membrane signaling systems, activation and inhibition of adenylate cyclase, GTP-binding regulatory components and second messengers, ras oncogene mediated signaling, activation pathway of MAP kinase.
q. Hormonal control of cell growth and cell cycle control, mechanisms of cross talk between steroid and protein hormone pathways.
r. Relationships between cellular oncogenes, growth factors and protein hormone receptors (structure and function, signal transduction pathway).
s. Biosynthesis and processing of protein hormones and receptors

Key Dates

Tentative Midterm Dates: Midterm #1 **Friday October 7th**; Midterm #2 **Friday November 4th** (note: the midterms will be given during the normal classroom time, although in a larger room)

Due Date for grant proposal (Graduate Students Only)	**Tuesday Dec. 13th, noon**
Final Exam (Undergraduates only)	**Thursday, Dec. 15th, 7-10 pm**

Resources

All key resources needed for the class are in the Course Manuals or will be distributed as extra Pdf files via email (through bcourse)

In the space below, feel free to write the names and contact information for two or three classmates, in case you need notes from a missed class or wish to form a study group:

Evaluation of the Course

Please let me know how things are going during the course by email, in person or voice mail. Sometime during the middle of the semester I may solicite your feedback more formally on what is working well and what needs to be changed. Also, if you see me around campus (or at any sports events or other activities), feel free to introduce yourself and let me know how everything is going with the class and/or ask me any questions.

Fine Print

The course deadlines, assignments, exam times and material are subject to change at the whim of the professor.