

**BIOE 106**  
**Cell Biology for Engineers**  
**Spring, 2018**  
**4 units**

**Professor**                      Dr. Joel A. Spencer  
E-mail: joel.spencer@ucmerced.edu  
Office Hours: Thursdays, 10:30-12:30 pm, SE 2 Room 381

**TA**                                      Ameer Hashmi  
E-mail: [ahashmi@ucmerced.edu](mailto:ahashmi@ucmerced.edu)  
Office Hours: Tuesdays, 2:30-3:30 pm, SE2-Lobby

**Lecture**                              Tuesdays/Thursdays  
9:00-10:15 am, CLSSRM 114

**Discussion**                        Tuesdays  
1:30-2:20 pm, CLSSRM 266

**Final**                                      Tuesday, May 8th  
3:00-6:00 pm, CLSSRM 114

**Required Text:**            **Molecular Cell Biology** 8th Edition, by Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, and Anthony Bretscher

**Course Overview:** Cells are not only basic units of living organisms, but fascinating engineering systems with complex adaptability. This course will take concepts in contemporary cell biology and teach them using engineering perspectives and approaches - using quantitative and system perspectives to study when applicable. Because this course is interdisciplinary in nature, we expect that it will provide a challenging yet exciting experience to engineering students.

**Course Objectives/Student Learning Outcomes:** *By the end of this course, students will be able to:*

1. Show mastery of fundamental topics in cell biology: components of the cell, gene expression, signal transduction, cell signaling and diffusion, cells and their environment, cancer, and stem cells including ethics in stem cells.
2. Describe and use the fundamental tools and techniques used in cell biology.
3. Mastery of some engineering approaches, like modeling, to cell analysis.
4. Learn how to read and interpret experimental data.
5. Articulate the scientific vocabulary used in communicating information in cell biology.

**Relation to the following BioE (ABET) Program Learning Outcomes (PLOs):**

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (g) an ability to communicate effectively

(j) a knowledge of contemporary issues

**Prerequisites by Topic:** BIO 002, CHEM 10, CHEM 8

**Communicating with Instructors:** E-mail is reserved for administrative questions such as adding the course or making an appointment with the instructors. Please include “BIOE 106” in the subject line. Do not use e-mail for questions on course material – it is very inefficient for that purpose. Please use office hours, discussion sections, and the CatCourses discussion board for specific questions on the lecture and laboratory material.

**CatCourses:** Course materials will only be posted to CatCourses. The slides for each lecture will be posted in PDF format. Students are expected to print the notes themselves if they wish, at their own expense. Please inform the instructors if you are unable to access or print these materials.

**Grading:**

15% Midterm I

15% Midterm II

30% Final

20% Quiz (6 quizzes)

10% Project

10% Class participation (Attendance + Clicker Question Responses)

100 % Total

**Course Policies:**

1. Students are expected to attend each class as scheduled, and to be on time. Attendance may be taken at the beginning of each class.
2. Students may use laptops, notebooks, handhelds, etc. during lectures only for purposes related to the session content.
3. All cell phones must be turned OFF or in silent mode.
4. Students are expected to read their e-mails at least once every 12 hours, and are responsible for any class-related announcements or directives from the instructor that might be distributed on CatCourses.

**Note:** If circumstances occur that require cancellation of a class, students will be notified through CatCourses or by email. Please check your emails and CatCourses regularly for potential notifications.

5. Students are expected to be attentive and respectful of speakers and fellow students at all times.
6. For exams and quizzes, no notes allowed. A calculator may be needed.

**Lecture Topics:**

Molecules, Cells, and Model Organisms

Chemical and Biochemical Foundations

Protein Structure and Function

Culturing and Visualizing Cells

Advanced Microscopy

Biomembrane Structure

Transmembrane Transport of Ions and Small Molecules

Cellular Energetics  
Moving Proteins into Membranes and Organelles  
Vesicular Traffic, Secretion, and Endocytosis  
Signal Transduction and G Protein–Coupled Receptors  
Signaling Pathways That Control Gene Expression  
Cell Organization and Movement: Microfilaments, Microtubules, and Intermediate Filaments  
The Eukaryotic Cell Cycle and Cell Death  
Integrating Cells Into Tissues/Cell Homing/Tissue Engineering  
Stem Cells, Stem Cell Engineering, and Stem Cell Ethics  
Cancer Biology

**Clickers:** Clickers (or a ResponseWare device) will be used during lecture to review material, assess students' understanding, and take attendance. To use this service, students will need to register for a TurningTechnologies account using their UCMerced e-mail address. You are responsible for making sure your device is in good working order and that your account is active and up to date.

For new students, a four-year activation code will be bundled with the purchase of a clicker from the Campus Store. For returning students, the Campus Store will have one-year codes available for purchase to use with the existing clickers.

Instructions for registering a clicker can be found here:

<https://ucmit.screenstepslive.com/s/8228/m/25997/l/433740-registering-a-clicker-student>

Instructions for adding a license can be found here:

<https://ucmit.screenstepslive.com/s/8228/m/25997/l/433748-adding-a-license-student>

**Discussions:** The discussion section allows you to ask questions on any of the material. The format, content and organization of discussion sections are under the discretion of the teaching assistant. Attendance to discussion section is mandatory. Failure to attend discussion might result in being dropped from the course or receiving a failing grade. Students are encouraged to submit questions via CatCourses to their discussion TA. These questions must be pertinent to the material covered in class. More information about how to submit your questions will be provided by your TA.

**Quizzes:** 6 quizzes will be administered during discussion sections online through CatCourses. You will be able to drop the lowest quiz grade. There will be no make-ups or extra time allowed if you do not take the quiz. It is your responsibility to keep track of quiz due dates on CatCourses. Providing or receiving assistance on quizzes will be considered a violation of academic integrity.

**Exams:** There will be two midterm exams given during the course and a final exam. Midterm exams will be given in class on 02/15/18 and 03/22/18. The Final Exam will be held on Tuesday, 05/08/18 from 3:00 pm until 6:00 pm in CLSSRM 114. Students seeking to reschedule a midterm exam (due to an acceptable documented circumstances) should contact the Instructor at least one week before the scheduled exam in order to take the exam early. It will be at the sole discretion of the Instructor as to whether a student will be allowed to a) take an exam early, b) prorate points for a missed exam, or c) merely lose those points. **The final exam cannot be missed!**

**Academic honesty:** Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy.

**Disability Statement:** Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.

**Counseling and Psychological Services:** The mission of UC Merced Counseling and Psychological Services (CAPS) is to support the mental health and well-being of our students. It is the intention of all CAPS staff to provide a safe, confidential atmosphere of acceptance and accessibility to professionals in the field of psychology.

**Contact Information (Confidential Help)**

Phone: (209) 228-4266  
counseling@ucmerced.edu

**Discrimination & Sexual Violence Prevention:** The University of California is committed to creating and maintaining a community where all individuals who participate in university programs and activities can work and learn together in an environment free of harassment, exploitation or intimidation.

**Contact Information**

Phone: (209) 285-9510  
msalvador2@ucmerced.edu, Michael Salvador, Director of Compliance,

**CARE Office:** Campus Advocacy, Resources, & Education (CARE) provides prevention education for the UC Merced community to achieve an environment free from the threat of sexual violence, dating/domestic violence, and stalking. They provides free and confidential assistance for all UC Merced affiliates (including Undergraduate students, Graduate students, Staff and Faculty. Stop by KL 107.

**Contact Information (Confidential Help)**

Campus Advocate: Val  
(209) 386-2051  
Valley Crisis Center  
24/7 Hotline  
(209) 722-4357

**Food Assistances (HEROES):** CalFresh is a monthly stipend system that allows you to purchase food for no cost at all on your part. If you qualify for work study you most likely qualify for CalFresh.

**Contact Information**

Phone: 209-228-4187

heroes@ucmerced.edu