

**BIOE 106**  
**Cell Biology for Engineers**  
**Spring, 2107**  
**4 units**

**Professor**                    **Wei-Chun Chin, Ph.D.**  
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**Lecture**                      T, TH 1:30pm-3:20pm, KOLLIG 396

**Office Hours**                Friday 3-5pm

**Required Text:**        **Molecular Biology of the Cell** 6th Edition, by Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts , Peter Walter

**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 Program Learning Outcomes (PLOs):**

The course learning outcomes relate to the following BIOE program learning outcomes:

- PLO #1 An understanding of biology and physiology. (Course objective #1)
- PLO #2 The capability to apply advanced mathematics and engineering to solve problems at the interface of engineering and biology; (Course objective #3)
- PLO #3 The ability to make measurements on, and interpret data from, living systems. (Course objective #4)
- PLO #4 The ability to address problems associated with the interaction between living and non-living materials and systems. (Course objective #1)
- PLO #5 Professional and ethical responsibility. (Course objective #1)
- PLO # 6 The ability to communicate effectively in written, spoken, and visual formats with technical, professional, and broader communities. (Course objective #5)

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

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

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

**Grading**

60% Exams (3 midterms)

30% Final exam

10% Quiz and class participation

100 % Total

**Course Policies:**

1. Students are expected to read their e-mails and are responsible for any class-related announcements or directives from the instructor that might be distributed on CatCourses.
2. For exams and quizzes, no notes allowed. A calculator may be needed.

**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.