

BME50B CELL AND MOLECULAR ENGINEERING

- Catalog Data:** **BME50B Cell and Molecular Engineering (Credit Units: 4) S.**
Physiological function from a cellular, molecular, and biophysical perspective. Applications to bioengineering design. (Design units: 2)
- Textbook:** Alberts, B., et al., *Essential Cell Biology: An Introduction to the Molecular Biology of the Cell*, Second Edition, Garland Press. 2004
Wilson, J. and Hunt, T., *Molecular Biology of the Cell*, 4th Edition, ISBN 0-8153-3577-6
- References:** Class notes posted on course website: <http://eee.uci.edu>.
- Coordinator:** James P. Brody.
- Course Outcomes:** Students will be able to:
Read and interpret one and two dimensional protein gels.
Describe the differences between polyclonal and monoclonal antibodies.
Understand the difference between the 3' and 5 ends of DNA.
Describe how DNA mutagens occur and how they can be repaired.
Describe the difference between positive feedback and negative feedback, and between open loop and closed loop control.
Estimate the melting temperature for double stranded DNA based upon its sequence.
Describe the function of DNA restriction enzymes, ligases, and polymerases.
- Prerequisites By Topic:** Calculus, differential equations, general chemistry, and mechanics.
- Lecture Topics:** Membrane structure.
Membrane transport.
Energy and cells.
Energy generation in mitochondria and chloroplasts.
Intracellular compartments and transport.
Cell communication.
Cytoskeleton.
Cell cycle control and apoptosis.
Cell division.
Genetics, meiosis and heredity.
Tissues and cancer.
- Class Schedule:** Each class meets 3 hours per week for 10 weeks and students are assigned to a 1 hour discussion session per week.
- Computer Usage:** Numerical methods using Microsoft Excel or equivalent.
Document preparation, Microsoft Word or equivalent.
Web/e-mail access.
- Laboratory Projects:** None.

Professional Component: Contributes toward the Biomedical Engineering Topics and Major Design experience.

Relationship to Program Outcomes: This course relates to Program Outcomes 1, 2, 3, and 4 as stated at: http://www.eng.uci.edu/dept/objective_biomedical.

Design Content Description

Approach: Students are assigned to teams of five to seven students. Each team must complete three sequential projects. The projects are based upon a one page problem description. From this description, students must define the problem, design a solution, and justify their choices. (90%) Occasional lectures address the design process, including enumeration constraints, identifying the best alternatives, and the iteration of design. (10%)

Lectures: 100%

Laboratory Portion:

Grading Criteria:

Weekly Homework Assignments:	16%
Midterm exam:	20%
Final exam:	30%
Team-oriented design problems:	33%
Class participation and attendance:	<u>1%</u>
	100%

Estimated ABET Category Content:

Mathematics and Basic Science: 0 credit units or 0%

Engineering Science: 2 credit units or 50%

Engineering Design: 2 credit units or 50%

Prepared by: James P. Brody **Date:** July 2005

CEP Approved: Fall 2002