

Applied Biology and Biomedical Engineering

AB 110
**Biology I – Cell Structure and
Function**

Catalog Description

Introduces structures, mechanisms, and laboratory techniques in cellular and molecular biology. Discusses biomolecules, bioenergetics, biosynthesis, enzymatic function, genetics, and cellular regulatory systems.

Instructor(s)

Buchmann and Weiner.

Required/Elective

Required for AB and BE majors and AB minors; elective for other courses of study.

Class/Laboratory Schedule

Three 50-minute lecture sessions plus one 2.5-hour laboratory session per week for one quarter.

Prerequisites

None.

Textbook(s)

Biology, 7th edition, Campbell and Reece, Benjamin Cummings, 2005.

Course Objectives

After successful completion of this course, students will be able to:

- Describe fundamental aspects of a wide variety of cell/molecular biology topics such as metabolism, photosynthesis, cell communication, microbial models, and DNA technologies.
- Answer the question “How do we inherit traits?” with detailed and mechanistic explanations at multiple scales, including nucleotides, chromosomes, organelles, cells and cell division, gamete production, gene expression, protein production, and patterns of inheritance.
- Perform fundamental cell/molecular biology laboratory procedures including protein quantification, cell counts, gel electrophoresis, protein purification, and restriction mapping of plasmid DNA.

Course Topics

Structure and function of macromolecules
Metabolism
Cell and membrane structures and functions
Cellular respiration
Photosynthesis
Cell communication

Mitosis and meiosis
Mendelian principles of genetics
Genes, chromosomes, and inherited characters
Transcription and translation
Organization and control of eukaryotic genomes
DNA technology and genomics

Lab Topics

Protein quantification
Yeast cell culture and counting
Gel electrophoresis of DNA
Hypothesis testing and epistasis in corn
Restriction mapping of plasmid DNA

ABET Criteria

This course primarily addresses ABET Criteria a, b, g, j.

Program Outcomes

This course primarily addresses Biomedical Engineering Program Outcomes 1, 4, 6.

Professional Component

This course provides 0 credits of engineering science, 4 credits of basic science, 0 credits of basic math and 0 credits of engineering design.

Engineering practice, standards, and realistic constraints are not heavily emphasized in this fundamental science course.

Prepared by

Bill Weiner, 08/24/05