

University of Arkansas - Fort Smith
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General Syllabus

BIOL 4803 Cell and Molecular Biology

Credit Hours: 3

Lecture Hours: 3

Laboratory Hours: 0

Prerequisites: BIOL 3803/3801 Genetics/Laboratory and CHEM 2803/2801 Organic Chemistry I/Laboratory

Prerequisite or corequisite: BIOL 4801 Cell and Molecular Biology Laboratory

Effective Catalog: 2018~2019

I. Course Information

A. Catalog Description

An exploration of the molecular biological details involved in prokaryotic and eukaryotic cellular regulation.

B. Additional Information - None

II. Student Learning Outcomes

A. Subject Matter

The student who completes this course will be able to

1. Compare the major tenets of the cell theory.
2. Assess the central role of cells in life processes.
3. Classify the typical prokaryotic and eukaryotic cellular constituents and the function of each in the context of other cellular processes.
4. Classify the structure, function and significance of biological membranes.
5. Compare the role of DNA and RNA in gene expression and metabolism.
6. Analyze the role of chemistry in cellular processes.
7. Examine the molecular mechanisms of evolution.
8. Criticize the technology involved in genetic engineering and engage in discourse regarding the ethical and practical considerations of the technology.
9. Estimate the mechanisms and roles of cellular regulatory processes.
10. Analyze the cell cycle and the role of mitosis, meiosis and apoptosis in the life cycle of an organism.

B. University Learning Outcomes (ULO)

Analytical Skills

Critical Thinking Skills: Students will use critical thinking skills to develop hypotheses of expected outcomes prior to designing experimental procedures.

Ethical Decision Making

Students will conduct themselves in an ethical manner and evaluate ethical considerations during discussions of molecular research activities common to the discipline of cell biology.

Global and Cultural Perspective

Students will consider and evaluate procedures and ideas common to cell biology in terms of cultural beliefs.

III. Major Course Topics

- A. Introduction to proteins
 - 1. Protein synthesis, processing, and regulation
- B. The Nucleus
 - 1. Traffic between the nucleus and cytoplasm
 - 2. Internal organization of the nucleus
- C. Protein sorting and transport
 - 1. The Endoplasmic Reticulum
 - 2. The Golgi Apparatus
 - 3. The mechanisms of Vesicular Transport
 - 4. Lysosomes
- D. The Cytoskeleton and Cell Movement
 - 1. Actin, Myosin, and Cell Movement
 - 2. Microtubule Motors and Movement
- E. The Plasma membrane
 - 1. Structure of the membrane
 - 2. Transport of small molecules
 - 3. Endocytosis
- F. Cell Signaling
 - 1. Signaling molecules
 - 2. Signaling receptors
 - 3. Intracellular signaling networks
- G. The Eukaryotic Cell Cycle
 - 1. Regulators of the Cell cycle progression
 - 2. Events of M phase
- H. Cell Death and Cell Renewal
 - 1. Programmed Cell Death
 - 2. Stem Cells and Maintenance of Adult Tissues
- I. Cancer
 - 1. Tumor Viruses

2. Oncogenes
3. Tumor Suppressor Genes
4. Molecular approaches to treatment