

Revised: Fall 2016

Biology 206 Cell Biology

COURSE OUTLINE

Prerequisites:

One year of college biology or one year of college chemistry.

Course Description:

This course introduces the student to the ultra-structure and function of the smallest unit of life - the cell. Topics covered include: cellular metabolism, structure and function of cellular membranes, organelle function, cell communication and signal transduction, nature and control of the gene, cell cycle regulation and cancer development, and Immunology. The laboratory component of this course will be used to reinforce concepts learned in the classroom, and will offer students the opportunity to employ techniques used in current cell biology research.

Semester Credits: 4 Lecture Hours: 3 Lab/Recitation Hours: 1

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Course Outcomes

At the completion of this course, the student should be able to:

1. Demonstrate an understanding of the molecular structure and function of cells
2. Develop an appreciation of the evolutionary theory as a unifying principle of Biology
3. Understand the relationship between cellular structure and human disease
4. Perform a variety of lab techniques
5. Design experiments and employ appropriate techniques to solve biological problems
6. Communicate scientific data effectively orally and in writing
7. Design and conduct experiments following the scientific method
8. Critically read, understand, review and communicate scientific literature
9. Write scientific papers in proper scientific format and discuss their meaning

Textbook:

Essential Cell Biology, by Alberts, Bray, Hopkin, Johnson, Lewis, Raff, Roberts, Walter.
Garland Science Publishing. 4th edition. ISBN: 9780815344544.

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Topical Description:

<u>Topics</u>	<u>Chapter</u>
I. Introduction to Cell Biology	1
A. Basic Properties of Cells	
B. Prokaryotic and Eukaryotic Cells	
C. Model Organisms	
II. DNA and Chromosomes	5
A. Structure and Function of DNA	
B. Eukaryotic Chromosomes	
C. Regulation of Chromosome Structure	
III. DNA Replication, Repair and Recombination	6
A. DNA Replication	
B. Repair	
C. Recombination and Mobile Genetic Elements	
IV. Gene Expression	7
A. Transcription	
B. Translation	
V. Control of Gene Expression	8
A. Overview	
B. Transcriptional Switches	
C. Post Transcriptional Control	
VI. Proteins	
A. Amino Acid Structure and Characteristics	2
B. Shape and Structure of Proteins	4
C. How Proteins work	4
D. Control and Study of Proteins	4
VII. Membrane Structure	11
A. The Lipid Bilayer	
B. Membrane Proteins	



VIII. Membrane Transport	12
A. General Principles	
B. Transporters	
C. Ion Channels	
a. Membrane potential	
b. Signaling in nerve cells	
IX. Cell Communication	16
A. General Principles	
B. G Protein Coupled Receptors	
C. Enzyme Coupled receptors	
X. Cytoskeleton	17
A. Intermediate filaments	
B. Microtubules	
C. Actin Filaments	
XI. Cell Division	18
A. Overview of the Eukaryotic Cell Cycle	
B. S Phase	
C. M Phase	
D. Mitosis	
E. Cytokinesis	
F. Control of Cell Number	
XII. Cellular Communities	20
A. Cancer biology	



Suggested Laboratory Sessions

1. Introduction to Laboratory Safety
2. Pipetting
3. The Scientific Method and Statistics
4. Solution Preparation
5. Column Chromatography
6. Multiweek experiments utilizing the scientific method and current applicable molecular techniques. Techniques employed may include, but are not limited to:
 - a. Polymerase Chain Reaction
 - b. Agarose gel electrophoresis
 - c. Acrylamide gel electrophoresis
 - d. Western Blot analysis
 - e. Southern Blot
 - f. Protein extraction from fish muscles
 - g. Microarray technology
 - h. DNA and RNA extraction (if time allows)

Teaching Methods

This course is traditionally team taught, with as many as five instructors delivering both lecture and laboratory material. The amount of instructional time allocated to each topic can vary from instructor to instructor, according to their expertise and interest, but all points are covered.

Notes to Instructors

1. Departmental policy dictates that instructors do not allow students to keep tests.
2. A comprehensive final exam counting 15% - 20% of the total grade will be given at the end of the semester.
3. Syllabus should state what the course grade will be based on, such as tests, quizzes, a comprehensive final exam, and any other assignments made by the instructor.

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4. The VWCC Biology Department uses a 10 point grading scale.
5. Comprehensive study of the listed topics is beyond the reasonable expectations of a 15-week Cell Biology course. It is up to the discretion of the instructor to choose which topics are more detailed but each topic should be adequately covered.

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