

CELL BIOLOGY
BIOL3030
Spring 2010
Tuesday/Thursday 8:00 am-9:15 am
Memorial Field House 2100

INSTRUCTORS:

Dr. Deborah Vestal
BO 2009C
383-4134
530-1581
Deborah.Vestal@utoledo.edu

OFFICE HOURS

Tues. 9:20-10:30 and Thurs. 9:20-10:15, by appointment

COURSE DESCRIPTION

The focus of Cell Biology is the study of the structure and function of the cell. In this course we will focus on Eukaryotic cell biology and will cover topics such as membrane structure and composition, transport, and trafficking; the cytoskeleton and cell movement; the breakdown of macromolecules and generation of energy; and the integration of cells into tissues. We will also cover important cellular processes such as cell cycle regulation, signal transduction, apoptosis (programmed cell death), and cancer cell biology. Throughout the semester we will attempt to relate defects in these various cellular processes to human diseases to help gain a better understanding for what happens when cells don't work as they should.

REQUIRED TEXT

Lodish et. al. *Molecular Cell Biology*. Sixth Edition. Freeman Press.

A free Companion Website accompanies the book at <http://bcs.whfreeman.com/lodish6e>. There you will find activities, animations, podcasts, classic experiments, as well as self-quizzes and additional resources that you might find useful when preparing for exams.

There is also a study companion and solutions manual available (*Working with Molecular Cell Biology*, Storrie et al. Freeman Press) that some students may find helpful.

IMPORTANT DATES

Jan. 14-Instructor signature required

Jan. 25- Last day to add/drop

Feb. 2-EXAM I

Mar. 2-EXAM II

Mar. 27-Last Day to Withdraw

Mar. 30-EXAM III

May 4-FINAL EXAM (8:00 am-10:00 am)

STUDENT EVALUATION

There will be three in-class exams during the semester. The first will count for 15% of your final grade and the second and third will each count for 25% of your final grade. The final exam will count for 35% of your final grade.

The in-class exams will consist of approximately 50 multiple-choice questions. These exams will only cover new material (i.e.-material covered since the previous exam)

The final exam will be comprehensive and will likely consist of approximately 100 multiple-choice questions. About 70% of the final exam will cover topics discussed since the third exam. The remaining 30% will cover topics discussed from the start of the semester.

Students arriving more than 10 minutes late for an exam will not be allowed to take the exam. In addition, under no circumstances will students be able to take an exam once other students have completed the exam and left the room.

Bring 2-3 sharpened number 2 pencils with good erasers to the exam.

Students must present a picture I.D. to the instructor or proctors when turning in exams.

If an exam is missed, I must be notified within 48 hours and documentation of the reason for missing the exam should be provided. Acceptable excuses include a death in the immediate family and illness of the student.

Make-up exams will be given at the discretion of the instructor and will consist primarily of essay type questions. Because of this, it is likely that make-up exams will be more difficult than the exam taken in class.

Exams will be based on materials from lectures and assigned textbook readings, however material covered in the lectures will be emphasized so students should attend class and take detailed notes. The instructors will not provide lecture notes, so if you miss a class be sure to get notes from other students.

TENTATIVE GRADING SCALE

% of available marks	Grade	Standard
90-100	A	Achievement of outstanding quality
88-89	A-	Achievement of slightly less than outstanding quality
85-87	B+	Achievement of slightly more than high quality
78-84	B	Achievement of high quality
75-77	B-	Achievement of slightly less than high quality
73-74	C+	Work of slightly more than acceptable quality
64-72	C	Work of acceptable quality
62-63	C-	Work of slightly less than acceptable quality
61-62	D+	Work slightly above the quality expected
52-60	D	Work below the quality expected
50-51	D-	Work slightly below the quality expected

CLASS SCHEDULE

Jan.	12	Introduction to Cell Biology
	14	Protein Structure and Function
	19	Protein Structure and Function/Membranes and Cell Architecture
	21	Membranes and Cell Architecture
	26	Membranes and Cell Architecture
	28	Membrane Transport
Feb.	2	EXAM 1
	4	Cellular Energetics
	9	Translation Overview
	11	Membrane Trafficking
	16	Membrane Trafficking
	18	Vesicular Traffic, Secretion, and Endocytosis
	23	Vesicular Traffic, Secretion, and Endocytosis
	25	Metabolism and Movement of Lipids
Mar.	2	EXAM II
	4	Cytoskeleton-Microfilaments and Intermediate Filaments

	9	Spring Break
	11	Spring Break
	16	Cytoskeleton-Microtubules
	18	Integrating Cells into Tissues
	23	Integrating Cells into Tissues
	25	Immunology
	30	EXAM III
Apr.	1	Cell Signaling
	6	Cell Signaling
	8	Signaling Pathways that control Gene Activation
	13	Signaling Continued/ Cell Birth, Lineage, and Death
	15	Cell Birth, Lineage, and Death
	20	Cell Cycle and Cell Growth Control (Dr. Song-Tao Liu)
	22	Cancer Cell Biology
	27	Cancer Cell Biology
	29	Development
May	5	FINAL EXAM-8:00-10:00 am

<u>TOPIC</u>	<u>BOOK CHAPTER</u>
<u>Introduction to Cell Biology</u>	Chap. 1
<u>Protein Structure/Function</u>	Chap. 3
Structure	
Folding/Modifications/Degradation	
Enzymes	
Molecular Motors	
Regulation of Protein Function	
<u>Biomembrane Structure</u>	Chap. 10
Lipid Composition and Structure	
Protein Components	
Organelles	
Cytoskeleton	
Purification of Cells and Cell Parts	
Visualization of Cells	

<u>Membrane Transport</u>	Chap. 11
ATP pumps and ionic environment	
Ion Channels and Membrane Potential	
Cotransport-Symporters and Antiporters	
Movement of Water	
Transepithelial transport	
EXAM I	
<u>Cellular Energetics</u>	Chap. 12
Oxidation of glucose and fatty acids	
Electron Transport and generation of Proton-motive force	
<u>Translation Overview</u>	Chap. 4 (4.3 and 4.4)
From RNA to Protein	
<u>Membrane Trafficking</u>	Chap. 13
Organelles	
-Secretory proteins	
-Membrane proteins	
Modifications	
Protein Sorting: Mitochondria, and Peroxisomes	
<u>Vesicular Traffic, Secretion, and Endocytosis</u>	Chap. 14
Studying Secretory Pathways	
Mechanism of Vesicular Trafficking	
Early Stages of Secretory Pathway	
Late Stages of Secretory Pathway	
Receptor-mediated Endocytosis and Sorting of internalized proteins	
<u>Metabolism and Movement of Lipids</u>	Chap. 10.3
Phospholipids and Sphingolipids	
Cholesterol	
Movement into and out of cells	
Feedback regulation	
Atherosclerosis	
EXAM II	
<u>Cytoskeleton</u>	
<u>Microfilaments and Intermediate Filaments</u>	Chap. 17
Actin Structures and assembly	

Myosin-powered cell movement
Cell locomotion
Intermediate Filaments

<u>Microtubules</u>	Chap. 18
Myotubule Organization and Assembly	
Kinesin and Dynein-Powered Movement	
Microtubules and Motor Proteins in Mitosis	
<u>Integrating Cells into Tissues</u>	Chap. 19
Basic Histology-Cell Types	
Adhesion	
Junctions and Adhesion Molecules	
Extracellular Matrix of epithelial cells	
Extracellular Matrix of non-epithelial cells	
Adhesive interactions and nonepithelial cells	
<u>Immunology</u>	Chap. 24
Overview of host defenses	
Immunoglobulins	
Antibody diversity of B-cell development	
MHC	
T-cells	
Adaptive immunity	
EXAM III	
<u>Cell Signaling</u>	Chap. 15
Signaling Molecules and Cell-Surface Receptors	
Intracellular Signal Transduction	
G-Proteins and: cAMP	
Ion Channels	
Phospholipase C	
Transcription	
<u>Signaling Pathways that control Gene Activation</u>	Chap. 16
TGF β	
Cytokines and JAK-STAT	
Receptor Tyrosine Kinases and Ras	
MAP Kinases	
PI-3 Kinase	
NF-kappaB	
Down-modulation of Receptor Signaling	

<u>Cell Birth, Lineage, and Death</u>	Chap. 21
Birth of cells	
Cell-type specification yeast	
Specification and Differentiation of Muscle	
Asymmetric Cell Division	
Cell Death	
<u>Cell-Cycle and Cell-Growth Control</u>	Chap. 20
Overview of the Cell-Cycle	
Overview of Model Systems	
Cell-Cycle control in Mammalian Cells	
Checkpoints in Cell-Cycle Regulation	
<u>Cancer Cell Biology</u>	Chap. 25
Tumor cells and onset of cancer	
Genetic Basis of Cancer	
Oncogenes and Tumor Suppressor Genes	
Carcinogens and DNA Repair in Cancer	
<u>Development</u>	Chap. 22
Highlights of Development	
Cell Patterning in early embryos	
Body segmentation	

STATEMENT OF ACADEMIC DISHONESTY

Department of Biological Sciences

Academic dishonesty by students enrolled in undergraduate and graduate courses and programs offered by the Department of Biological Sciences will not be tolerated. Academic dishonesty includes but is not limited to:

1. Obtaining assistance from another individual during an examination.
2. Giving assistance to another individual during an examination.
3. The unauthorized use of study material or textbooks during an examination.
4. Changing answers on an examination after it has been returned and then submitting it for regrading.
5. Plagiarizing written assignments. Plagiarizing includes but is not limited to: a) Copying laboratory reports from previous years, b) copying or paraphrasing reports, term papers, or these prepared by other students, c) unauthorized collaboration in the preparation of reports, term papers, or theses, and d) use of another author's materials without appropriate acknowledgement through quotation and citation.
6. Attempting to bribe or otherwise induce an instructor to alter either a grade or examination score.
7. Obtaining or attempting to obtain a copy of an examination prior to its administration.

In accordance with policies presented in The Student Handbook and The University Catalog, Instructors have the responsibility and right to report cases of alleged dishonesty to departmental, college, and university administrative units. Students involved in academic dishonesty may expect to receive a grade of F on specific assignments as well as in the course where the assignment was made. In addition, disciplinary action may be recommended through appropriate college and university disciplinary committees. Please consult your instructor for instructions on the implementation of this policy.