CELL BIOLOGY
BIOL3030
Spring 2013
Tuesday/Thursday 9:50-11:30 am
BO 1049

INSTRUCTOR:
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OFFICE HOURS Tuesday/Thursday 3:00-4:30 pm

COURSE DESCRIPTION
The focus of Cell Biology is the study of the structure and function of the cell. In this course we will concentrate on Eukaryotic cell biology and will cover topics such as protein structure, dynamics and function; 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 course 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 do not work as they should.

REQUIRED TEXT AND OTHER REFERENCES

TEXTBOOK: Lodish et. al. *Molecular Cell Biology*. Seventh 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.

Lecture slides will be posted at course website hosted at http://www.utoledo.edu/dl/index.html. We will use the Blackboard 9 system. Note that the slides may NOT contain all the contents of the lectures.

IMPORTANT DATES

June 24	First day of class
July 1	Last day to add/drop
July 3	EXAM 1
July 4	No class
July 15	EXAM 2
July 19	Last day to withdraw
July 23	EXAM 3
August 1	EXAM 4

STUDENT EVALUATION

The course will be divided into four parts. Accordingly there will be four exams during the semester, each covering the materials in corresponding lectures. All exams will consist of 50 multiple-choice questions. The total of the exams will count for 100% of your final grade, with each exam worth 25%.

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, the instructor must be notified within 48 hours and documentation of the reason for missing the exam must be provided.

Make-up exams will be given at the discretion of the instructors 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.

GRADING SCALE

% of available marks	Grade	Standard
≥90	A	Achievement of outstanding quality
≥88	A-	Achievement of slightly less than outstanding quality
≥85	B+	Achievement of slightly more than high quality
≥78	B	Achievement of high quality
≥75	B-	Achievement of slightly less than high quality
≥72	C+	Work of slightly more than acceptable quality
≥64	C	Work of acceptable quality
≥62	C-	Work of slightly less than acceptable quality
≥61	D+	Work slightly above the quality expected
≥52	D	Work below the quality expected
≥50	D-	Work slightly below the quality expected

CLASS SCHEDULE

June	24	I. Introduction to Cell Biology/Chemical Foundation
	25	II. Protein Structure and Function
	26	III. Membranes and Cell Architecture
	27	IV. Subcellular Organelles and Methods in Cell Biology
July	1	V. Membrane Transport
	2	VI. Cellular Energetics
	3	**EXAM 1**
	4	**No Class**
	8	VII. Protein synthesis and sorting
	9	VIII. Protein synthesis and sorting
	10	IX. Vesicular Traffic, Secretion, and Endocytosis
	11	X. Vesicular Traffic, Secretion, and Endocytosis
	15	**EXAM 2**
	16	XI. Cytoskeleton-Microfilaments and Intermediate Filaments
	17	XII. Cytoskeleton-Microtubules
	18	XIII. Cell Cycle and Cell Growth Control
	22	XIV. Integrating Cells into Tissues
	23	**EXAM 3**
	24	XV. Cell Signaling: General Ideas
	25	XVI. Cell Signaling: Short-Term Cellular Responses
	29	XVII. Cell Signaling: Signaling Pathways that control Gene Activation
	30	XVIII. Cell Birth, Lineage, and Death
	31	XIX. Cancer Cell Biology
Aug.	1	**EXAM 4**

TENTATIVE TOPICs	**BOOK CHAPTER**
Introduction to Cell Biology/Chemical Foundation	Chap. 1&2
Protein Structure/Function Structure Folding/Modifications/Degradation Enzymes Molecular Motors Regulation of Protein Function	Chap. 3
Biomembrane Structure Lipid Composition and Structure Protein Components Organelles & Cytoskeleton	Chap. 10&9

Purification of Cells and Cell Parts
Visualization of Cells

Membrane Transport — Chap. 11
- ATP pumps and ionic environment
- Ion Channels and Membrane Potential
- Cotransport-Symporters and Antiporters
- Movement of Water
- Transepithelial transport
- Nerve Cells-Voltage Gated Channels
- Neurotransmitters

Cellular Energetics — Chap. 12
- Oxidation of glucose and fatty acids
- Electron Transport and generation of Proton-motive force

EXAM 1

Protein synthesis and sorting — Chap. 4 (4.3 and 4.4)&13
- From RNA to Protein
- Protein targeting
  - -Secretory proteins
  - -Membrane proteins
- Protein Modifications
- Protein Sorting: Mitochondria, Chloroplasts, Peroxisomes

Vesicular Traffic, Secretion, and Endocytosis — Chap. 14
- Studying Secretory Pathways
- Mechanism of Vesicular Trafficing
- Early Stages of Secretory Pathway
- Late Stages of Secretory Pathway
- Receptor-mediated Endocytosis and
  - Sorting of internalized proteins
- Synaptic vesicle function and formation

EXAM 2

Cytoskeleton

Microfilaments and Intermediate Filaments — Chap. 17
- Actin Structures and assembly
- Myosin-powered cell movement
- Cell locomotion
- Intermediate Filaments

Microtubules — Chap. 18
- Myotubule Organization and Assembly
- Kinesin and Dynein-Powered Movement
- Microtubules and Motor Proteins in Mitosis

Cell-Cycle and Cell-Growth Control — Chap. 19

- Overview of the Cell-Cycle
- Overview of Model Systems
- Cell-Cycle control in Mammalian Cells
- Checkpoints in Cell-Cycle Regulation

Integrating Cells into Tissues — Chap. 20

- 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

EXAM 3

Cell Signaling — Chap. 15

- Signaling Molecules and Cell-Surface Receptors
- Intracellular Signal Transduction
- G-Proteins and: cAMP
  - Ion Channels
  - Phospholipase C
  - Transcription

Signaling Pathways that control Gene Activation — Chap. 16

- TGFβ
- Cytokines and JAK-STAT
- Receptor Tyrosine Kinases and Ras
- MAP Kinases
- PI-3 Kinase
- NF-kappaB
- Down-modulation of Receptor Signaling

Cell Birth, Lineage, and Death — Chap. 21

- Birth of cells
- Specification and Differentiation of Muscle
- Asymmetric Cell Division
- Cell Death

Cancer Cell Biology — Chap. 24

- Tumor cells and onset of cancer
- Genetic Basis of Cancer
- Oncogenes and Tumor Suppressor Genes
- Carcinogens and DNA Repair in Cancer

EXAM 4

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.