Syllabus Cell Biology

BIOL 300 Spring 2021

Days	Time	Room
T Th	10:00—11:15	ISC 131

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Office hours ISC350

Mon 10:30 am – 12:00 pm
Tues 11:30 am – 1:00 pm
and by appointment

Overview

In this course we will explore how life exists at the cellular and molecular level. We will discuss how proteins and other macromolecules are regulated by cellular organization. This will lead us to an understanding how the cells regulate communication and cell organization.

Proteins.

What determines the shapes of proteins and how is this related to their function? What are the roles of proteins in cells and how are they regulated? How can misfolding of proteins contribute to disease?

Cell membranes.

What is the composition of plasma membranes? How is transport across membranes accomplished and regulated? How does membrane transport enable physiological events, such as muscle contraction?

Cellular compartmentalization.

What are the functions of organelles and how do they accomplish them? How is material sorted and transported between intracellular compartments and how is this regulated? How are secretion and endocytosis accomplished?

Organization of cells into tissues.

How do cells interact with their environment and with each other? How do cells use adhesion and the cytoskeleton to regulate their shape, and accomplish functions such as muscle contraction, mitosis, and cell migration?

Signal transduction and cell-cell communication.

How do cells communicate with each other and interpret signals from their environment? How are these signals transduced into changes in cell behavior (such as cell cycle progression or apoptosis)? How does misregulation of cell signaling contribute to diseases such as cancer? What are stem cells, and what is the molecular basis of their properties?

Experimental approaches in cell biology.

Our knowledge of cell biology is based on experimental observations. In this class we will ask: how do we know what we know? What is the evidence? Much progress has been made towards understanding the structure and function of cells; however, there is still a vast amount to discover

Learning Outcomes

- Explain the basic facts, concepts, and principles in cell biology.
- Use and apply those facts, concepts, and principles appropriately, even in situations that you have not previously encountered.
- Interpret and evaluate evidence for hypotheses about cell structure and function.
- Devise strategies to address unsolved issues in cell biology.

Exams

Exam 1: March 4
Genetics, Energetics, Proteins

Exam 2: April 8
Organelles, transport, etc.

Comprehensive Final: May 8, 8 am
Cell Signaling, Cell Cycle, Stem Cells, Cancer

Assignments

Assignment 1	Feb 4
Assignment 2 (individual)	Feb 19
Assignment 2 (group)	Feb 25
Assignment 3 (individual)	Mar 19
Assignment 3 (group)	Mar 25
Assignment 4 (individual)	Apr 1
Assignment 4 (group)	Apr 6
Assignment 5 (individual)	Apr 20
Assignment 5 (group)	Apr 29
Assignment 6	May 11

Text

Essential Cell Biology, Alberts et al., fifth edition. ISBN: 978-0-393-67953-3

Alternative Advanced Text Molecular Biology of the Cell, Alberts et al., sixth ed. ISBN: 978-0-8153-4432-2

Schedule

The material for this course is divided into six units. Before each, a handout that gives learning objectives and reading assignments for that unit will be posted on myCourses.

Unit 1: Proteins and Techniques

1	T	2/2	Course Overview; Cell Biology techniques
2	R	2/4	Cell Energetics Protein structure, folding, and regulation
3	T	2/9	Protein regulation, cont.
4	R	2/11	Protein folding diseases; Cell biology techniques

Unit 2: The Plasma Membrane - Structure and Function

5	T	2/16	Plasma membrane structure
6	R	2/18	Passive transport
7	T	2/23	Active transport
8	R	2/25	Transport in vivo: muscle as an example; Protein sorting overview
	T	3/2	REJUVINATION DAY
	R	3/4	Midterm Exam #1 (Units 1 and 2)

Unit 3: Protein Sorting and Vesicular Transport

9	T	3/9	Nuclear transport
10	R	3/11	Nuclear transport, cont.; Transport into the ER
11	T	3/16	Transport into the ER, cont.; Vesicular transport, overview
12	R	3/18	Transport between the ER and Golgi; sorting by the Golgi
13	T	3/23	Endocytosis; Lysosomes - roles in disease and ageing

Unit 4: The Cytoskeleton and Cell Adhesion

14	R	3/25	Intermediate filaments
15	T	3/30	Microtubules
16	R	4/1	Actin filaments
17	T	4/6	Extracellular matrix and cell adhesion
R	4/8		Midterm Exam #2 (Units 3 and 4)

Unit 5: Cell Signaling

18	T	4/13	Review Exam 2/introduction to cell signaling
19	R	4/15	G-protein coupled receptor signaling
20	T	4/20	GPCRs, cont.; Enzyme linked receptors
	R	4/22	REJUVINATION DAY
21	R	4/27	Ras signaling pathway; Intro to the cell cycle

Unit 6: Cell Signaling at Work - Cell Cycle, Apoptosis, Cancer, and Stem Cells

22	R	4/29	Regulation of the cell cycle Apoptosis and necrosis
23	T	5/4	Cancer: cell signaling gone awry
24	R	5/6	Cancer, continued
25	M	5/10	TBD
26	W	5/12	TBD
	W	5/12	Last Date to withdraw with a W

Wireless policy

Laptop and hand-held computers are fine tools for learning, but can easily become a great distraction. Don't allow the tool to become a disruption. I request that during class you turn off sound, silence and ignore any distracting texts, and cell phone calls.

Accommodations

SUNY Geneseo is dedicated to providing an equitable and inclusive educational experience for all students. The Office of Accessibility will coordinate reasonable accommodations for persons with physical, emotional, or cognitive disabilities to ensure equal access to academic programs, activities, and services at Geneseo. Students with letters of accommodation should submit a letter to each faculty member and discuss their needs at the beginning of each semester. Please contact the Office of Accessibility Services for questions related to access and accommodations.

Office of Accessibility Services
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www.geneseo.edu/accessibility-office

Grading scale

This is the grading scale for this course.

93% - 100%	A	77% - 79.9%	C+
90% - 92.9%	A-	73% - 76.9%	C
87% - 89.9%	B+	70% - 72.9%	C-
83% - 86.9%	B	60% - 69.9%	D
80% - 82.9%	B-		

Please be aware that there is no extra credit offered to individuals - any extra credit opportunities will be offered to the entire class

Evaluation and Grading

Exercises:	50 points
Exam #1:	125 points
Exam #2:	125 points
Final Exam:	200 points
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	500 points total

Evaluation and Grading

Exercises will include **in class activities** and **homework assignments**. For the in-class activities, you must be present at the beginning of the exercise to earn points. Also note that there are no make-ups for the in-class activities; however, you can miss one with no penalty. **Homework is due at the start of class on the due date** (there will be a penalty for homework handed in late).

Most homework assignments will be completed in groups. For group homework assignments, each person is required to fully complete the assignment before meeting with his or her group. Each group will submit one completed assignment, and each person will also submit their initial answers. Students will receive the group assignment grade as long as their individual assignment is complete, and they attended the group meeting(s).

Plagiarism Please refer to the material in the "Academic Dishonesty and Plagiarism" page online, which describes various different types of plagiarism. Assignments containing plagiarism will receive no points.

Final Exam: May 19, 8 am. The final exam will be cumulative and 200 points. 125 points will be on material from Units 5-6; 75 points will be from Units 1-4.