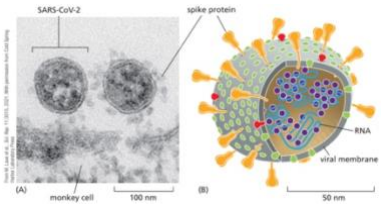
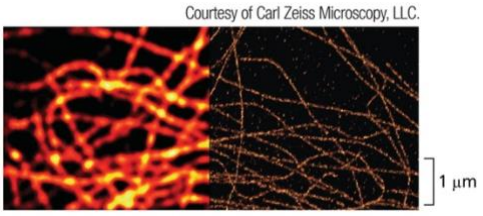
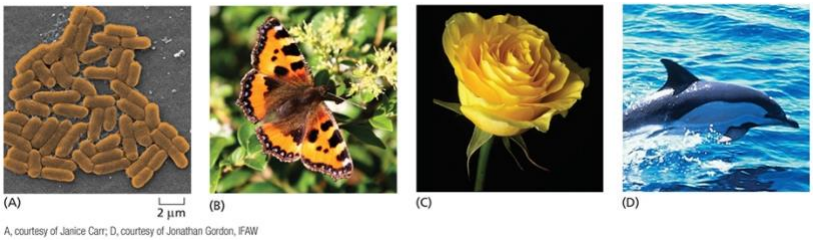


Cell Biology
BIOL 300

Fall 2025



When: Mon, Wed, Fri 8:30—9:20
Where: Bailey Building 101
Instructor: Dr. Travis Bailey
E-Mail: baileyt@geneseo.edu
Phone: 245-5437
Office: ISC 350



A, courtesy of Janice Carr; D, courtesy of Jonathan Gordon, IFAW

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.

Textbook

Essential Cell Biology, 6th Edition
Alberts et al., W. W. Norton
https://digital.wwnorton.com/ecb6

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.

How will you know that you are learning?

You will receive feedback on your progress with frequent assignments, including quizzes, as well as midterms, and a final exam. Each exam builds on previous concepts (is cumulative).

You can use the provided assignments to prepare for the midterms and the final exam. Please expect mistakes to be a natural part of the learning process. Midterms and the final exam are cumulative to provide you with multiple opportunities to improve your understanding of difficult concepts. Each exam will stress concepts covered during that third of the semester. Midterms and the final exam will contain a variety of questions, including multiple choice, fill-in-the-blank, and mini essay format, and ask you to recall, apply, and synthesize your knowledge. Midterm exams are designed to take 45 minutes individually and 30 minutes as a group.

Your grades are primarily determined by your work as an individual. In addition, a portion of your grade will be calculated by your work in a team. For each midterm, during the first 45 minutes you will first answer questions on your own. Then, you will immediately have 30 minutes to retake the midterm exam with your teammates. Working with your team will benefit you, because a portion of your team effort will be added to your individual score, as follows:

Your exam score = your initial score points + 1/2 (team retake midterm points- your team's average initial midterm points)

For example.
You earn a score of 90 points.
1st groupmate earns 70 points.
2nd groupmate earns 80 points. Thus: Initial Group Average = 80 points or 240/3

Team retake score is 85 points. → ½(Team Retake – Initial Group Average) = ½(85-80) = 2.5 points

You earn 92.5 points (90 initial points + 2.5 retake points)
1st groupmate earns 72.5 points.
2nd groupmate earns 82.5 points.

The instructor exercises the right to deny any student this team midterm benefit if there is evidence that a student is not contributing fairly to the team effort. In the event of an excused absence on a midterm date, group points on the make-up midterm will be determined by taking the average of group points over the whole semester.

Please note that any challenges to any grades recorded must be made within one week of that assignment's or midterm's return date.

Makeup Exam policy

I accommodate makeup exams for students with a valid excuse. To be fair to everyone in class and to follow departmental and university policies, documentation for such emergencies will be required. Makeup exams are not necessarily the regular exam. Please contact me as soon as possible if you need to make alternate arrangements. Geneseo policy does not allow me to alter finals so that people can leave campus early.

How to get the most out of this course:

- Peruse the PowerPoint slides and read the assigned pages from each chapter before you attend lecture.
- Finish the Assignments and then meet with your group to agree on answers.
- Complete the Textbook Extra Activities.
- Be alert and take good notes while studying. Review your learning after you attend lecture and determine the gaps in your understanding.
- Take charge of your own learning. Study for understanding of the concepts, not just memorization of facts.
- Consider studying virtually with other students or your group members to discuss the material and prepare for the exams.
- Get help when necessary. Feel free to email me anytime and I will be happy to help as soon as I can.
- In addition to attending office hours, you are welcome to schedule appointments with me, as time permits.

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 the course management program online.

Unit 1: Techniques - Protein Structure and Function				Chapter
1	M	25-Aug	Course Overview	
2	W	27-Aug	How We Study Cells	3
3	F	29-Aug	How We Study Cells	
	M	1-Sep	Labor Day	
4	W	3-Sep	Protein Properties	4
5	F	5-Sep	Amino Acids and Protein Folding	
6	M	8-Sep	Protein Techniques	
7	W	10-Sep	Protein Isolation and Assays	
8	F	12-Sep	Membranes and Lipids	11
9	M	15-Sep	Midterm Unit 1	

Unit 2: Membranes - Protein Sorting - Vesicular Transport				Chapter
10	W	17-Sep	Passive transport	12
11	F	19-Sep	Active transport	
12	M	22-Sep	Transport in vivo: muscle as an example	17
13	W	24-Sep	Intracellular Subdivisions	15
14	F	26-Sep	Nuclear transport	
15	M	29-Sep	Transport into the ER - Vesicular Transport	
16	W	1-Oct	Golgi Export - Endocytosis	
17	F	3-Oct	Endocytic Sorting - Autophagy	
18	M	6-Oct	Endocytosis in Regeneration	
19	W	8-Oct	Midterm Unit 2	

Unit 3: Cytoskeleton - Extracellular Matrix - Cell Adhesion				Chapter
20	F	10-Oct	Cytoskeleton - Intermediate Filaments	17
	M	13-Oct	No class - Fall Break	
21	W	15-Oct	Microtubules and Vesicular Transport	
22	F	17-Oct	MT's and cell cycle	
23	M	20-Oct	MT's and Cytokinesis	
24	W	22-Oct	Actin Dynamics	
25	F	24-Oct	Extracellular matrix	18
26	M	27-Oct	Extracellular matrix and cell adhesion	
27	W	29-Oct	Midterm Unit 3	

Unit 4: Cell Signaling				Chapter
28	F	31-Oct	Cell Communication	16
29	M	3-Nov	Cell Signaling	
30	W	5-Nov	Heterotrimeric G proteins	
31	F	7-Nov	Heterotrimeric G proteins - Retina	
32	M	10-Nov	Calmodulin - Ras signaling	
33	W	12-Nov	Signaling and Cell Cycle.pptx	
34	F	14-Nov	Cell Cycle and Apoptosis	
35	M	17-Nov	Midterm Unit 4	

Unit 5: Cell Signaling at Work				Chapter
36	W	19-Nov	Cyclins in Cell cycle	18
37	F	20-Nov	Tissue organization	
38	M	24-Nov	Cancer	
	W	26-Nov	Thanksgiving break	
	F	28-Nov	Thanksgiving break	
39	M	1-Dec	Cancer	
	W	3-Dec	Last Date to withdraw with a W	20
40	W	3-Dec	Stem Cells	
41	F	5-Dec	induced Pluripotent Stem Cells	
42	M	8-Dec	Review for exam	
	F	12-Dec	Final Unit 5	8-10:30 am

Accessibility

- SUNY Geneseo strives to provide an equitable and inclusive educational experience for all students. The Office of Accessibility coordinates reasonable accommodations for persons with documented physical, emotional, or cognitive disabilities, as well as medical conditions related to pregnancy or parenting.
- Share with me your letter of accommodation at the beginning of the semester and discuss with me the specific arrangements that can help you succeed. Please contact the Office of Accessibility Services for questions related to access and accommodations.

  Office of Accessibility Services
  Erwin Hall 22
  (585) 245-5112

Safeguarding your mental health

- Diminished mental health, including significant stress, mood changes, excessive worry, or problems with eating and/or sleeping can interfere with optimal academic performance. The source of symptoms might be strictly related to your course work; if so, please speak with me. However, problems with relationships, family worries, loss, or a personal struggle or crisis can also contribute to decreased academic performance.
- SUNY Geneseo provides mental health services to support the academic success of students. Counseling Services, a part of the Lauderdale Center for Student Health & Counseling, offers free, confidential psychological services to help you manage personal challenges that may threaten your well-being.
- In the event I suspect you could be helped by support, I will express my concerns and the reasons for them, and remind you of resources (e.g., Counseling Services, Career Services, Dean of Students, etc.) that might be helpful to you. It is not my intention to know the details of what might be bothering you, but simply to let you know I am concerned and that help, if needed, is available. Getting help is a smart and courageous thing to do for yourself and for those who care about you.

Evaluation and Grading

Exercises:	15%
Exams Units 1-5:	17% each = 85% total

	100% total

Extra credit: *4%* (*Illumine*) must be done by last day of classes

Grading scale

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-	

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).

Academic Honesty and Plagiarism

- Academic dishonesty includes cheating, knowingly providing false information, plagiarizing, and any other form of academic misrepresentation. Academic dishonesty will not be tolerated in this course.
- Please refer to the material in the "Plagiarism" pages on Geneseo.edu library website, which describes various types of plagiarism. Assignments containing plagiarism will receive no points.
- If you're struggling, please ask me for help before you resort to cheating! I would rather struggle with you than file a report, creating a record with the department chair, the Dean of the College, and at the Dean of Students Office.

Copyright Notice

Note on letters of recommendation: Many students ask a letter of recommendation because this challenging course gives opportunity to demonstrate your critical thinking and groupwork soft skills. I write letters using examples from your coursework. If you plan on asking for a helpful letter, make sure your work is impressive not merely passing.

Group Assignments and Evaluation of Your Peers.

To practice and demonstrate interpersonal skills you will work on assignments together with a small group. You will also evaluate the contributions you and your group partners make to assignments. The kind of partner you are judged to be by your peers you will factor into your *Group Assignments* grade and has the potential to alter your grade up to half of a grade. There will be up to four people in each group. You will evaluate each other regarding professional integrity not on capability.

You should not divide up the work. Each person should understand every point of the homework. Group interaction is preparation for group work on exams. Unparticipating people who force the others in the group to take up extra work will not receive full credit for group assignments.

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 often use TopHat, which will use your smart phones or laptops to do in-class quizzes. Please keep them charged and handy. Participation is part of your grade. I request that during class you turn off sound, silence and ignore any distracting texts, and cell phone calls.