

# BIO 550: Cell Physiology

## Syllabus

### Fall 2024, Section 009



**Professor:** Dr. Nick Pullen; phone: (970) 351-1843; email: [nicholas.pullen@unco.edu](mailto:nicholas.pullen@unco.edu);  
**Office hours:** email me to set a time, or drop-in if my door is open, Ross Hall 2536.  
You can read about my background [here](#) and my research lab's work [here](#).

**Place & Time:** Ross Hall 0280, 11:15AM-12:05PM, MWF

**Final Exam:** Friday, December 13, 8AM-10:30AM ([link](#) to finals schedule)

**Required Text:** *Molecular Cell Biology*, 9<sup>th</sup> ed. by Lodish, *et al.* ([Macmillan](#), 2021). It does not matter whether this is hard copy, electronic, new, or used.

**Course Description & Purpose:** The brief catalog entry is found [here](#). Undergraduate-level preparation in basic cell biology, genetics, and chemistry is assumed.

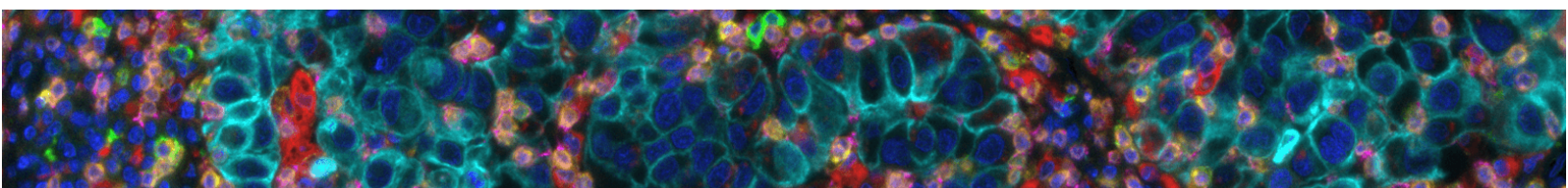
All physiology is ultimately about cell physiology. This class will focus on how animal cells communicate with each other, and how they respond to environmental changes to maintain homeostasis. We will start with a review of the fundamentals required, such as chemistry, biomolecules, membranes, and metabolism. Then we will study principles of cell signaling and how cells organize into tissues. Finally, we will examine cells in the two major distributed control systems of homeostasis (nervous and immune), as well as aberrations in cell physiology leading to cancer.

This course predominantly serves graduate programs in biomedical sciences. Its content is about the cells underlying mammalian/human physiology (*i.e.*, we attempt to infer a lot about humans from experiments in mice). We will **not** substantively address cell physiology of plants, fungi, prokaryotes, or unicellular eukaryotes.

#### Overall Course Student Learning Objectives:

- Describe the necessary components for maintaining a living animal cell.
- Identify and describe major cell signaling mechanisms.
- Identify commonly used experimental techniques and the kinds of data they generate.
- Relate concepts at the cellular level to homeostasis of a multi-cellular organism.
- Synthesize selected primary literature/data with concepts in cell physiology.
- Accurately discuss and critique selected concepts and primary literature.
- Develop hypotheses and experimental plans to address problems or gaps of knowledge on selected topics in cell physiology.

There are also more specific, unit-level, learning objectives presented with the content as the course proceeds. Those unit-level objectives are a starting point for those who like making personal study guides.



## LECTURE SCHEDULE

<u>Date</u>		<u>Topic</u>	<u>Reading (Lodish)</u>
Aug 26	<b>UNIT 1: The Cell Basics</b>	Introduction; chemistry & physic review	Chap. 1&2
Aug 28		Chemistry & Physics Review	Chap. 2
Aug 30		Biomolecules	"
Sep 2		<b>No Class – Labor Day</b>	
Sep 4		Proteins	Chap. 3
Sep 6		"	"
Sep 9		"	
Sep 11		Membranes	Chap. 10
Sep 13		"	"
Sep 16		Transport	Chap. 11
Sep 18		"	"
Sep 20		Membrane Proteins	Chap. 13
Sep 23		"	"
Sep 25		Membrane Traffic	Chap. 14
Sep 27		"	"
Sep 30		Discussion/Review	
Oct 2		<b>EXAM 1</b>	
Oct 4	<b>UNIT 2: Cells Talk</b>	Fundamentals of Signal Transduction	Chap. 15
Oct 7		Signal Transduction and GPCRs	Chap. 15
Oct 9		"	"
Oct 11		Other Major Signaling Pathways	Chap. 16
Oct 14		"	"
Oct 16		"	"
Oct 18		"	"
Oct 21		The Extracellular Matrix and Forming Tissues	Chap. 20
Oct 23		"	"
Oct 25		Responding to the Environment	Chap. 21
Oct 28		"	Chap. 21
Oct 30		"	"
Nov 1		Discussion/Review	
Nov 4		<b>EXAM 2</b>	
Nov 6	<b>UNIT 3: Cells in Control of You</b>	Cellular Neuroscience	Chap. 23
Nov 8		"	"
Nov 11		"	"
Nov 13		"	"
Nov 15		Immunology	Chap. 24
Nov 18		"	"
Nov 20		"	"
Nov 22		"	"
Nov 25		Discussion/Review	
Nov 27		<b>No Class – Thanksgiving</b>	
Nov 29		<b>No Class – Thanksgiving</b>	
Dec 2		Cancer	Chap. 25
Dec 4		"	"
Dec 6		"	"
Dec 13		<b>FINAL EXAM (8AM – 10:30AM)</b>	

**Course Conduct:** This is an in-person class. Since this is a graduate level class, I assume that you are developing scientific authority in your field. Therefore, *as a colleague* I also expect the following of you:

- Regular attendance
- Regular and meaningful contributions to class discussions
- Independent curiosity for the topics covered
- Read the book, but also read beyond the book
- Ask questions
- Maintain a collegial atmosphere
- Follow all guidelines and policies outlined in the “BEAR Code” found [here](#)
- **No posting of course materials outside of Canvas**

I strongly encourage you to participate in the community of the biology department. We have a weekly seminar on Fridays 3:35PM-4:25PM where visiting scientists and students present and defend their current research. Often this work has to do with cell physiology. A schedule of topics and speakers is posted [here](#).

Course content is derived from the assigned text (Lodish) and relevant literature. You have access to the content through [Canvas](#). I post slides, literature, and other potential interesting resources there. Anything labeled “FYI:” is not expected reading, and I will not assess you on it – it’s just for fun. You will be assigned a letter grade (no +/-) based on scores from exams, quizzes, and paper discussion activities.

**Grades:** I will assign letter grades based on the overall percentage of points earned through exams, quizzes, and paper discussion assignments. Letters will correspond to the typical 10% scale:

<i>Assignments</i>		<i>Course Letter Grade</i>
Exams (3)	300 points (100 each)	A ≥90%
Quizzes (10)	100 points (10 each)	B ≥80% to <90%
Paper Activities	30-50 points (10 each)	C ≥70% to <80%
<b>Total</b>	<b>430-450 points</b>	D ≥60% to <70%
		F <60%

**Exams:** There will be three exams worth 100-points each taken through Canvas. They will consist of multiple choice, short answer, and sometimes longer response questions. Exams are cumulative. The first two exams are given during the regular semester, and the last exam happens during finals week. The last exam’s length is no different than the others. Their dates are found in the course schedule and will not change.

**Quizzes:** There will be ten quizzes worth 10-points each taken through Canvas. These will mostly be multiple choice with occasional free response. These will be open for several days and typically due by a Sunday night. I will send an announcement through Canvas when I post a quiz. There is no time limit, but there is only one attempt allowed. I expect these to be done independently.

**Paper Discussions:** We will discuss 3-5 primary papers this semester worth 10-points apiece. Each paper will have a specific “summary” assignment with guided prompts/rubric in Canvas. You will have 5-7 days to review the papers. I will send an announcement through Canvas when I post these.

Please also see [this webpage](#) page for important university-wide policies and student support contacts such as disability resources, counseling, and cultural & resource centers.

If you have any questions outside of class time, the best way to reach me is by [email](#).

If my office door is open, feel free to stop in for a chat.