

## Bi214 General Biology IV: Mechanisms

This course is about how stuff works: the mechanisms by which biological processes, practiced by all cellular life, operate. Through a combination of lectures, problem solving, and laboratory exercises we will explore amino acid chemistry, the structures and functions of proteins, the genetics of biochemical pathways, the structure and regulation of prokaryotic and eukaryotic genes, and the genetics and molecular biology underlying development. Bi211 and Bi212, or the equivalent, and a full year of General Chemistry are prerequisites.

### Contact Info:

Instructors	Email	Instructors	Email
Dr. Connolly	amyc@uoregon.edu	David Evarts (BULA/BTU)	devarts@uoregon.edu
Zoe Irons (GE)	ziron@uoregon.edu	Diana Nguyen (BULA)	dianan@uoregon.edu
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Ethan Shaw (GE)	ethanshaw10@gmail.com	Nelly Nouboussi (BTU)	nnoubous@uoregon.edu
		Starla Chambrose (BULA/BTU)	starlac@uoregon.edu

Lab Times (Klamath 13)	GE	BULAs
Wednesday 1:00-3:50 PM	Emily	Diana
Wednesday 4:00-6:50 PM	Emily	Starla
Thursday 9:00-11:50 PM	Ethan	David
Thursday 12:00-2:50 PM	Gabriel	Bryson and Minh
Thursday 3:00-5:50 PM	Zoe	Nisha and Bryson
Friday 9:00-11:50 PM	Nelson	None at the present

**Class Time:** 150 Columbia (MWF 12:00-12:50).

### Tutor/TA Time:

Please see Canvas home page for updates or changes. All office hours will be in Klamath 32

#### Monday

10:00-11:00 Onyx 275	Emily
1:00- 2:00pm B009 Science Library	Nelly
2:00-3:30 32 Klamath	Dr. Connolly

#### Tuesday

9:45-10:45 B009 Science Library	Starla
12:00-1 <b>TBD</b>	Zoe
1:30-2:30 B009 Science Library	Starla

#### Wednesday

1:00-2:00 B009 Science Library	Starla
3:00-4:00 <b>TBD</b>	David

#### Thursday

12:00-1:00 <b>TBD</b>	Nelson
12:00- 2:00pm B009 Science Library	Nelly

#### Friday

11:00-12:00 TBD  
1:00-2:00 32 Klamath

Ethan  
Gabriel

### Required Supplies

#### **1) Customized text book:**

- The required book is a customized text that incorporates material from *Biochemistry* (Mathews, et al., 4<sup>th</sup> ed.), *Molecular Biology of the Gene* (Watson, et al., 7<sup>th</sup> ed.), and *iGenetics* (Russell, 3<sup>rd</sup> ed.), and includes original material. The general text used in Bi211-213, *Biological Science* (Scott Freeman), may be helpful, but is not required. If you have *Biological Science* in your possession you may want to keep it as a reference book; however, I do not recommend that you purchase Freeman's book solely for this course.

#### **2) Laboratory manual:**

- This can be purchased at the UO Bookstore. If the UO Bookstore is out, you must request an order, and they should be able to get you one promptly. We will not have copies available in lab or on reserve in the Science Library.
- Note that it is your responsibility to order these; we will not have copies available in class or lab

#### **3) Workbook**

- This can be purchased at the UO Bookstore.

#### **4) Scientific Calculator**

### Grading

The breakdown is below:

Exam 1	20%
Exam 2	20%
Final exam	30%
Lab Reports (8 with lowest one dropped)	10%
Lab Quizzes (8 with lowest one dropped)	20%

90-100            A range  
80-89            B range  
70-79            C range  
60-69            D range  
59 and below   F

Grades will be awarded using the above grading scale as a general guideline. I cannot tell you the precise cut offs for a + or – for each grade, as this will depend upon where there are natural breaks in the total class scores. I can say however, your final grade in the class will not be lower than the above scale. So an 80 will always earn you at least a B-. If you have a 79.9 in the class, it could earn you a C+ or a B-, it will just depend on where these natural breaks in class grades fall at the end of the term.

**My philosophy on curves:** A true curve means that your grade is dependent upon how you do in relation to everyone else. If I curved the class, I might say the top 25% of the class will get As. But what if 35% of the class made a 90 and above? That would mean that there would be 10% of the class that wouldn't receive an A despite having earned at least a 90. The opposite could be true, in that only 15% of the class made a 90, but I pull 10% of people in the upper 80 category to make an A. What I don't like about curves is that it encourages competition instead of collaboration between students. Downward curves can punish hard working people, and upward curves can unfairly reward others. And sometimes when people rely on a curve, they let their work slide. I would rather foster a classroom environment where we are all focused on helping one another learn the material.

This class is hard, and there may be low averages on exams or quizzes. I will not curve individual exams or quizzes. If there are low scores my goal is to work with the class to improve the next assessment (without compromising rigor), and hopefully the next assessment will be higher. At the end of the term I will evaluate the class as a whole, compare to other terms and reflect upon how the course ran in general. I will take these factors into consideration to determine whether the grading scale is appropriate for this particular class. As mentioned above, I will never shift the grading scale so that you get a lower grade than the guidelines above (i.e. a 91 instead of a 90 is the requirement for an A-). **I will not know what these cut offs will be until after the final. At the end of the term, please do not ask for your grade to be bumped. Your request will play no role in the decision making, so please do not ask.**

**Grading Policies:** The final exam is cumulative. **Make-up and early exams will not be offered. The final exam is mandatory.** They will be based upon the reading, lectures, and relevant problems and material for that week. **Make-up and early quizzes will not be offered.** However, exceptions may be made for verifiable medical or family emergencies, and for sanctioned University travel, and will be considered on a case-by-case basis. UO Club sports events do not qualify for exceptions.

All exams and quizzes must be written in pencil; use an eraser to remove mistakes and unnecessary writing. Exams and quizzes are graded on the correctness of the answer for which the question is asked, and on correctly followed directions. **Exams will not be handed back.** There will be a special office hour held where you can review your exam. Quizzes and reports will be returned. Quizzes will be taken at the beginning of lab. All quizzes, and reports with grading errors must be returned to the GE **within one week** of your receiving the graded assignment for consideration, and must be accompanied by a written explanation. For any exam that with a grading error, a written explanation must be attached to the exam and given to the GE or myself **during special exam viewing hours.** Requests for your instructor to look over an answer without a specific identified grading error will not be considered. Note: *The entire exam, quiz, or report will be reviewed.*

Problem sets will not be turned in for grading. However, working the problems will be your best form of preparation for the exams and quizzes, so you are encouraged to make a sincere effort in solving them. Problem set answers are posted on Canvas.

**Do not ask for extra credit. Do not ask for your grade to be bumped. Your request will be denied.**

### **Laboratories**

Laboratories begin the second week. We will do a total of 7 laboratory exercises. The exercises, background information, and report pages are contained within the lab manual. You must read the material BEFORE coming to your lab. Details of the lab format, assignments, and grading are included in the lab manual. This course is full, so you may not be able to switch lab sections if a conflict arises for you in a given week. Labs begin on time with a lab quiz at the start. If you are late you will miss out on quiz time. You must fill out the preparation questions in your lab manual before coming to lab.

**Late Policy on Lab Reports:** Your lab reports are due at the start of the following class. In order to not be docked late points, lab reports must be turned in on time. **Reports that are turned in late will receive an automatic ½ off. Lab reports will not be accepted two week past their deadline. You may not miss a lab and then turn in a completed lab.** Those reports will receive a 0.

### **Course website**

We use Canvas for the course website. On the site you will find the syllabus, lecture and lab schedules, staff e-mail contacts and office hours, problems set answers, course and lab announcements, supplementary reading, and grade access.

### **Accommodations for students with disabilities**

If you have a documented disability and anticipate needing accommodations in this course, please make arrangements to meet with me as soon as soon as possible. Please bring a notification letter from the Accessible Education Center stating your approved accommodations.

### **Class conduct and academic honesty**

Class starts promptly at 12:00 and ends at 12:50. Please arrive on time and do not pack up before the conclusion of the lecture. Arriving late and leaving early is disruptive to others around you and to the speaker. Do not talk during lecture in a volume audible to anyone but the intended recipient. **Please do not use any electronic devices during class;** they are of no help to your learning, and are distracting to those around you and to the lecturer.

**Personal computers will not be allowed in lecture or lab.** However, flat electronic devices that you write on like a notebook are acceptable. If you have a requirement for using a computer to take notes, please make accommodations with me on the first day of class. Your use of the computer may be monitored by a teaching assistant.

All work submitted in this course must be your own. Instances of suspected cheating or plagiarism on exams, quizzes, and reports will be referred to the Office of Student Conduct and Community Standards. Your instructors take these cases seriously. Academic misconduct could result in a failing mark for quiz, exam, report or for the course. For definitions of violations, a description of the hearing process, and a summary of penalties for findings of academic misconduct, go to <http://policies.uoregon.edu/vol-3-administration-student-affairs/ch-1-conduct/student-conduct-code>

## Class Schedule

Week	Date	Topic	Reading
1	Apr 1	Syllabus, Introduction, Amino Acids Structure, Stereo-chemistry	1-11
	Apr 3	Amino acid structure, Solubility Rules	12-18, 44 (interactions)
	Apr 5	Acid Base Chemistry <i>*Bring Calculator</i>	18-23
		<b>No Lab</b>	
2	Apr 8	Ionization of Amino Acids; Acid-base properties of amino acids <i>*Bring Calculator</i>	23-28
	Apr 10	Acid-base properties of amino acids continued; Polypeptide Properties <i>*Bring Calculator</i>	29-32
	Apr 12	Protein structure: Primary, Secondary (Alpha Helices)	32-37
		<b>Lab 1 Amino acid chemistry</b> <i>*Bring Calculator</i>	
3	Apr 15	Protein Structure: Secondary (Beta Sheets), tertiary and quaternary	16 (hydrophobic effect; 37-46)
	Apr 17	Protein Structure/Function: Examine Hemoglobin	46-51
	Apr 19	Hemoglobin Cooperativity in hemoglobin; Allosteric Effectors of Hemoglobin	51-56; 72-75
		<b>Lab 2 Protein structure</b>	
4	Apr 22	<b>EXAM 1</b> <i>*Bring Calculator</i>	
	Apr 24	Allosteric Effectors of hemoglobin continued...	56-64
	Apr 26	Structure of DNA	77-89
		<b>Lab 3 Hemoglobin</b>	
5	Apr 29	DNA Replication	77-89
	May 1	DNA Replication cont.. and Mutations	89-99
	May 3	Mutations continued	100-106
		<b>Lab 4 DNA structure</b>	
6	May 6	Metabolic Pathways	107-108
	May 8	Conditional Mutants to study Gene Function: Examine <i>C. elegans</i> and <i>Neurospora</i>	108-113
	May 10	Complementation Tests to Identify Gene Identity for Unknown Mutants	

		<b>Lab 5 Mutagens</b>	
		Will need to return to lab 4 days later. Lab is open between 8:00 am -5:00 pm M-H and 8:00 am-3:00 pm on Friday <b>Wednesday's Lab:</b> Monday <b>Thursday's Lab:</b> Monday <b>Friday's Lab:</b> Tuesday	
7	May 13	<b>EXAM 2</b>	
	May 15	Anatomy of a Gene; Regulating Gene Expression by Controlling Transcription: Prokaryotes	65-67, 114-120
	May 17	Regulating Gene Expression Through Transcription in Prokaryotes: Examine Lac Operon in <i>E. coli</i>	120-128
		<b>Lab 6 Complementations</b>	
		Will need to return to lab <i>twice</i> . Lab is open between 8:00 am -5:00 pm M-H and 8:00 am-3:00 pm on Friday. <b>Wednesday's Lab:</b> First return: Thursday; Second return: Friday before 3pm <b>Thursday's Lab:</b> First return: Friday before 3pm; Second return: Monday <b>Friday's Lab:</b> First return: Monday; Second return: Tuesday	
8	May 20	Negative regulation of the <i>lac</i> operon	129-137
	May 22	Positive regulation of the <i>lac</i> operon	137-140
	May 24	Regulating Cell Differentiation in Eukaryotes: Examine Yeast. Yeast as a model organism, life cycle of yeast	141-146
		<b>Lab 7 Gene Regulation</b> <b>Begin 8 Lac Operon</b>	
		Will need to return to lab 24 hours later. Lab is open between 8:00 am -5:00 pm M-H and 8:00 am-3:00 pm on Friday <b>Wednesday's Lab:</b> Thursday <b>Thursday's Lab:</b> Friday <b>Friday's Lab:</b> Saturday- lab will be open between 9:00-11:00am	
9	May 27	<b>Memorial Day</b>	
	May 29	Mechanism of switching mating types in yeast, regulation transcription of <i>HO endonuclease</i>	141-146
	May 31	Mechanism of switching mating types in yeast through asymmetric cell division	Chang and Drubin *Canvas
		<b>Lab 8 Lac Operon</b>	
		Will need to return to lab 24 hours later. Lab is open between 8:00 am -5:00 pm M-H and 8:00 am-3:00 pm on Friday <b>Wednesday's Lab:</b> Thursday <b>Thursday's Lab:</b> Friday <b>Friday's Lab:</b> Saturday- lab will be open between 9:00-11:00am  Lab report due in your GE's box by your lab time this week	
10	June 3	Regulation Transcription in Eukaryotes: Examine hemoglobin expression through development	150-154
	June 5	Hemoglobin expression through development continued	154-160 69-72; 75-76 Banks *Canvas
	June 7	Review Session	

		<b>No Lab.</b>	
	June 10 10:15am	<b>Final Exam</b> <i>*Bring Calculator</i>	