# Bi281H (Fall 2021; 11208) Honors Biology I Biochemistry and Cell Physiology

# **Syllabus**

## **Course Objectives**

- Survey key molecular and cellular features shared by all organisms on earth, revealing how life can be understood in physical and chemical terms.
- Begin to develop intuition and analytical tools to think about life quantitatively and molecularly.
- Introduce several key, universal systems that are shared across organisms including serine proteases, hemoglobin, glycolysis/gluconeogenesis, the Citric Acid Cycle, the Electron transport chain, and ATP synthase.
- In this course, we will emphasize developing reasoning and skills over memorizing facts.

# **Teaching Philosophy**

- Trust students to take initiative for their own learning.
- Provide multiple opportunities per week for interactions with instructors.
- Be organized, clear, and consistent.
- Do not try to artificially limit student access to outside material: embrace that students will have access to the Internet and their peers, just as they will throughout their careers.
- Have many opportunities to get small numbers of points.

# People

- Molly Jud (lecture; mjud@uoregon.edu)
- Laurel Pfeifer-Meister (lab instructor; lpfeife1@uoregon.edu)
- Jordan Brown (GE, jbrown32@uoregon.edu)
- Kana Suzuki (GE, ksuzuki@uoregon.edu)
- Mikala Capage (Biology Tutor, mcapage@uoregon.edu)
- Sera Kaplow (Biology Tutor, skaplow@uoregon.edu)
- Angelica Mejia (Biology Tutor, amejia7@uoregon.edu)
- Jiayi Yin (Biology Tutor; jyin5@uoregon.edu)

# **Getting Help**

- For questions about grades and personal issues, please email Molly or Laurel.
- Office Hours: see help session page.

# **Textbook**

• Pratt & Cornely *Essential Biochemistry* (4th edition, though 2nd and 3rd also work). Online material is not required.

## Canvas

- All class materials (lecture slides, worksheets, etc.), excepting the textbook readings, will be posted or linked on canvas and are available for download.
- All lecture quizzes, pre-labs, and lab puzzles will be taken as Canvas quizzes.
- Exams will be in person (on paper).
- We will post official announcements on canvas.
- The points posted on Canvas are the official point totals. If you think there has been a mistake with your points, please contact Molly or Laurel.

# **Summary of class components**

Component	Points	Number	Total	% points
Clicker/Lecture attendance (*you can miss up to 3 lectures)	1	25-3*	22	2.2%
Pre-class quizzes (*low score dropped)	2	26-1*	50	5%
Midterm 1	150	1	150	15%
Midterm 2	150	1	150	15%
Final	300	1	300	30%
Pre-lab	5	7	35	3.5%
Lab report	20	8	160	16%
Lab puzzles (*low score dropped)	20	6-1*	100	10%
Class discretionary points	33	1	33	3.3%
	1,000	100%		

# **Detailed description of components (graded and ungraded)**

## **Clicker questions/lecture attendance (graded)**

- Objectives:
  - Expand on biochemical content
  - Develop skills to reason about biochemistry
  - Develop a community of scholars
  - o Provide a low-stress way to accumulate points in the class
- What is it (typically)?
  - 5-30 min introduction/lecture; remaining time working together to answer clicker/worksheet questions
  - Need to answer at least one clicker question during the lecture time to get full attendance points
- When to do it?
  - o In lecture on Monday, Wednesday, Friday from 10:00 to 10:50 am
  - O You may miss up to three classes without penalty. If you forget your clicker but do show up to class, this will still be considered an unexcused absence.

### **Pre-class quizzes (graded)**

- Objectives:
  - o Prime students for the in-class discussion and work
  - o Provide a low-stress way to accumulate points in the class
- What is it?
  - o Simple questions, designed to get you thinking about the material
  - Based on the assigned readings
  - o You get 50% of the points just for taking the quiz
- When to do it?
  - Do the reading before taking the quiz
  - o Quizzes open at 12 pm the day before class and closes at 9:30 am the day of class

### Homework (ungraded)

- Objectives:
  - Provide skills practice
- What is it?
  - Questions covering the skills we cover in class
  - You will not turn this homework in; however, these problems provide essential practice for the skills in the class
- When to do it?
  - Post-class
  - Due dates are assigned for each assignment to help you pace yourself through the course
  - o Keys will be posted on the due date for each assignment

### Midterms and Final (graded)

- Objective:
  - o Assess student understanding of the material (summative assessment)
- What is it?
  - In-person exams
  - You may work together with your peers to study for the exam; however, the exam will be closed note/closed peer/closed internet, thus, the work you show must be your own. Cheating will be strictly prohibited. If we find evidence of cheating, both students will receive a zero on the question.
  - The questions will build in complexity. The first question in a block will be straightforward; the last question in a block will be highly challenging and integrate multiple concepts.
- When to do it?
  - o The two Midterms will be evening exams on Wednesdays 10-20-21 and 11-10-21, both 7:00-9:00pm in COL 150. Midterm 1 will cover Unit 1 content. Midterm 2 will cover Unit 2 content.
  - o The Final will be on Wednesday 12-8-21 from 10:15am-12:15pm in GER 302. The Final will be cumulative, covering all material from Units 1-3.
  - We expect the exam will take about two hours to complete.
  - also see <u>Course Schedule</u> for dates/times/locations/unit content covered in each exam

Note about exam grades: Your exam component will be calculated using Method #1 (in the table above) or Method #2 (lowest midterm dropped; best midterm x 1.33 = 200 pts; Final x 1.33 = 400 pts) — whichever gives a higher score. The second method is designed to help in the event that you do poorly on one of the midterms by dropping that exam and placing higher weight on the other midterm and final. We will automatically select the better score for you.

### **Class Discretionary points (graded)**

- Objectives:
  - o Encourage you to be good class/lab citizens
- What is it?
  - o Molly/Laurel discretionary points awarded to you at the end of the term
  - Based upon active participation, group cooperation, workstation cleanup, punctuality, etc.
- When to do it?
  - o During both lab and lecture

# **Grading**

- Letter grades will be determined based on total points, not on individual exams and assignments. Getting:
  - o >90% of the points (900) guarantees an A-
  - o >80% (800), B-

- o >70% (700), C-
- o and >60% (600), D-

In the event that scores are skewed downward, the final scores will be curved with breaks between each bin determined by "jumps" in the grade data that separate groups of students. This curve is designed so that it can only help you. If the entire class receives >90%, every student would receive an A-.

• Late policy: late work will not be accepted. (This is because we immediately post keys for each assignment when the due date closes).

## **Course Schedule**

Readings: page numbers for Essential Biochemistry 4th edition by Pratt & Cornely.

*Pre-class Quiz (Q): quiz to be done before class starts (numbers correspond to the lecture #)* 

Worksheet for class (W): clicker-related questions (numbers correspond to the lecture #; will be added as we go)

*Lecture slides (S) (numbers correspond to the lecture #; will be added as we go)* 

Homework (numbers correspond to the week #)

**UNIT 1: BIOLOGY IS JUST CHEMISTRY** 

Week #	Date	Торіс	Reading	Quiz	Class material	HW	Lab (due)
	9/27	Introduction					Life at the Molecular Level (beginning of lab wk 2; 10/5-7)
1	9//9	Molecular driving forces	10- 12,25-32	<u>Q2</u>		TT1	
	10/1	Acids & Bases		<u>Q3</u>			
	10/4	Amino acids	89-96	<u>Q4</u>			Pre-Lab (10/5 at 9am) Amino acids (beginning of lab wk 3; 10/12-14) Puzzle (10/11 midnight)
2	10/6	Protein structure	96-103	<u>Q5</u>			
2	11()/X	GE/BULA Field Questions Day					
	10/11	Protein folding	104-108	Q7			Pre-Lab (10/12
3	10/13	Protein recognition	170, 261-263	<u>Q8</u>			at 9am) <u>Protein</u>

	10/15	Enzymes I: catalysts	154-165	Q9		structure (beginning of lab wk 4; 10/19-21) Puzzle (10/18 midnight)
	10/18	Review session		Q10		
4	10/20	MIDTERM 1 (COL 150; 7:00- 9:00pm; Unit 1 content)				See below in Unit 2

# **UNIT 2: MOLECULAR MACHINES**

Week #	Date	Торіс	Reading	Quiz	Class material	HW	Lab (due)
4	10/20	Enzymes II: mechanism of serine protease	166-175	Q11		<u>H4</u>	Pre-Lab (10/19 at 9 am) Enzymes (beginning of lab wk 5; 10/26-28) Puzzle (10/25 midnight)
	10/22	Enzymes III: Michaelis Menten analysis	183-194	Q12			
	10/25	Enzymes IV: regulation Enzymes from 30,000 feet.	195-206	Q13			Pre-Lab (10/26 at 9am) Allostery & Cooperativity (beginning of lab wk 6; 11/2-4) Puzzle (11/1 midnight)
5	10/27	Hemoglobin cooperativity	122-132	<u>Q14</u>		<u>H5</u>	
	10/29	Hemoglobin allostery	122-132	<u>Q15</u>			
	11/1	Cytoskeleton (Structure and Motor Proteins)		<u>Q16</u>		<u>H6</u>	Pre-Lab (11/2 at 9am) Membrane Permeability and Transport (11/10 10 am) Puzzle (11/8 midnight)
6	11 1/3	Membrane proteins	240-248	<u>Q17</u>			
	11/5	Signaling	258-268	<u>Q18</u>			
7	11/8	Review session					See below in Unit 3

MIDTERM 2 (COL 150; 7:00- 9:00pm; Unit 2	 		
9:00pm; Unit 2 content)			

## **UNIT 3: FIGHTING ENTROPY**

Week #	Date	Торіс	Reading	Quiz	Class material	HW	Lab (due)
7	11/10	REDOX review	385-388	<u>Q20</u>		H7	No Lab
	11/12	Sugar I: glycolysis	329-340	<u>Q21</u>		<u>Π/</u>	(Veterans Day)
	11/15	Sugar II: gluconeogenesis	341-347	Q22			Pre-Lab (11/16 at 9am) Metabolism (11/24 10 am) Puzzle (11/22 midnight)
8	11/17	Citric Acid Cycle	359-379	<u>Q23</u>		<u>H8</u>	
	11/19	Citric Acid Cycle	374-379	<u>Q24</u>			
	11/22	OXPHOS I: Electron transport	384-397	<u>Q25</u>		Hy I	No Lab (Thanksgiving)
		OXPHOS II: Electron transport	398-404	Q26			
	11/26	Thanksgiving, no lecture					
	11/20	Photosynthesis (light rxn)		Q28			
10		Photosynthesis (dark)	410-421	Q29		H10	Pre-Lab (11/20 at 9 am) Respiration (12/3 10 am)
	11 //3	Metabolism at high level	422-429	Q30			
11	12/8	FINAL (GER 302; 10:15am-12:15pm; Cumulative=Units 1-3 content)					

# **Community**

## This class is governed by the UO community standards.

- Respect the dignity and essential worth of all individuals.
- Promote a culture of respect.
- Respect the privacy, property, and freedom of others.
- Reject bigotry, discrimination, violence, or intimidation of any kind.
- Practice personal and academic integrity and expect it from others.

#### **Students with Disabilities**

If you have a documented disability and anticipate needing accommodations in this course, please make arrangements to meet with Mike soon. Please bring a notification letter from the <u>Accessible Education Center</u> outlining your approved accommodations. In particular, if remotelearning will be an issue, please let me know as soon as possible so I can work with you.

## Cheating

You are expected to do your own work. Cheating, plagiarism and any other form of academic dishonesty will not be tolerated. Group work is encouraged throughout this class, however, the work you turn in should be your own interpretation of the group discussion. Exactly copying text and/or graphs is not permitted. Please refer to the University of Oregon Student Conduct Code.

#### Academic Disruption

In the event of a campus emergency that disrupts academic activities, course requirements, deadlines, and grading percentages are subject to change. Information about changes in this course will be communicated as soon as possible by email, and on Canvas. If we are not able to meet face-to-face, students should immediately log onto Canvas and read any announcements and/or access alternative assignments. Students are also expected to continue coursework as outlined in this syllabus or other instructions on Canvas.

In the event that the instructor of this course has to quarantine, this course may be taught online during that time.

## **COVID** Containment Plan for Classes

As the University of Oregon returns to in-person instruction, the key to keeping our community healthy and safe involves **prevention**, **containment**, and **support**. Here is information critical to how the UO is responding to COVID-19.

- **Prevention**: To prevent or reduce the spread of COVID-19 in classrooms and on campus, all students and employees must:
  - o Comply with vaccination policy

- o <u>Wear face coverings</u> in all indoor spaces on UO campus
- o Complete weekly <u>testing</u> if not fully vaccinated or exempted
- o <u>Wash hands</u> frequently and practice social distancing when possible
- o Complete daily <u>self-checks</u>
- o Stay home/do not come to campus if feeling symptomatic
- o Complete the UO <u>COVID-19 case and contact reporting form</u> if you test positive or have been in close contact with a confirmed or presumptive case.
- Containment: If a student in class tests positive for COVID-19, all relevant classes will be notified via an email by the Corona Corps Care Team with instructions for students and staff based on their vaccination status. Specifically:
  - Vaccinated and Asymptomatic students: Quarantine not required, but daily selfmonitoring before coming on campus is advised; sign up for testing through MAP 3-5 days after exposure if advised you are a contact."
  - Unvaccinated or partially vaccinated students: 14-day quarantine advised do not come to class and sign up for testing 3-5 days after notification through MAP, if asymptomatic, or through University Health Services (541-346-2770) or your primary care provider, if symptomatic.
  - Symptomatic students: stay home (do not come to class/campus), complete the online <u>case and contact form</u>, and contact University Health Services (541-346-2770) or your primary care provide to arrange for immediate COVID-19 testing.

Students identified as a **close contacts** of a positive case will be contacted by the Corona Corps Care Team (541-346-2292).

- Support: The following resources are available to you as a student.
  - o University Health Services or call (541) 346-2770
  - <u>University Counseling Center</u> or call (541) 346-3277 or (541) 346-3227 (after hrs.)
  - o MAP Covid-19 Testing
  - o Corona Corps or call (541) 346-2292
  - o <u>Academic Advising</u> or call (541) 346-3211
  - o *Dean of Students or call (541)-346-3216*

### Good Classroom Citizenship

- Wear your **mask** and make sure it fits you well
- Stay home if you're sick
- Get to know your neighbors in class, and let them know if you test positive
- **Get tested** regularly
- Watch for **signs and symptoms** with the daily symptom self-check
- Wash your hands frequently or use hand sanitizer

Complete the UO COVID-19 <u>case and contact reporting form</u> if you test positive or are a close contact of someone who tests positive.

# **Lab Description**

In labs, you will explore the key principles of biochemistry and cell physiology. Our hope is that you will gain a better understanding of the lecture material by encountering it from a different, and often "hands on," perspective. We are not trying to train you in research techniques, though you will have be introduced to some. Rather, the material presented in lecture will be reinforced and elaborated upon through the manipulation of biological models, problem solving, and quantitative reasoning. You will get the most out of all of the activities if you approach them with questions in mind. Thus, the labs include many questions designed to prompt additional questions from you. This process of posing questions and finding solutions is an important part of the scientific method. So, when you are working on the labs, remember that it is much more important to try to understand what you are doing and make connections with the material from lecture, while you are doing it, than to mindlessly answer questions.

Teaching labs for Honors Biology is one of things I enjoy most about my job. The small class size enables a chance to foster community that is nearly impossible in some of the larger lecture courses. I'm excited to be back full-time in person and I'm hopeful that you will form relationships in this course that will last your entire time at the UO and beyond. Please don't hesitate to reach out and let me know ways that I can help with this!

## **Lab Learning Outcomes**

- Understand the key molecular and cellular features shared by all organisms on earth, revealing how life can be understood in physical and chemical terms.
- Begin to develop intuition and analytical tools to think about life quantitatively and molecularly.
- Apply quantitative reasoning and analysis to biological science problems.

### Lab Schedule

Week	Lab Topic	Pre-Lab	Lab Report	Lab Puzzle
1	Life at the Molecular Level	none	Lab Report 1 (due at beginning of lab week 2 on Canvas)	none
2	Amino Acids	110/5 at 9 am)	INEGINNING OF IAN WEEK 3 ON	Lab 2 Puzzle (due Mon. 10/11 at midnight)
3	Protein Structure	Pre-Lab 3 (due Tues. 10/12 at 9 am)	INAGINNING OT IAN WAAK /I ON	Lab 3 Puzzle (due Mon. 10/18 at midnight)
4	Enzymes	11()/19 at 9 am)	INEGINNING OF IAN WEEK 5 ON	Lab 4 Puzzle (due Mon. 10/25 at midnight)
15	Allostery & Cooperativity	110/26 at 9 am)	lheginning of Iah week 6 on	Lab 5 Puzzle (due Mon. 11/1 at midnight)

6	Membrane Transport & Permeability	<u>Pre-Lab 6</u> (due Tues. 11/2 at 9 am)	•	<u>Lab 6 Puzzle</u> (due Mon. 11/8 at midnight)
1/	No Lab (Veterans Day)			
8	Metabolism	Pre-Lab 7 (due Tues. 11/16 at 9 am)		Lab 7 Puzzle (due Mon. 11/22 at midnight)
9	No Lab (Thanksgiving)			
10	Respiration	Pre-Lab 8 (due Tues. 11/30 at 9 am)	Lab Report 8 (due Friday 12/3 at 10 am on Canvas)	none (Final's week)

\*note all assignments are also assessable through the course calendar; In the event of a campus emergency that disrupts academic activities, course requirements, deadlines, and grading percentages are subject to change. Information about changes in this course will be communicated as soon as possible by email, and on Canvas. If we are not able to meet face-to-face, students should immediately log onto Canvas and read any announcements and/or access alternative assignments. Students are also expected to continue coursework as outlined in this syllabus or other instructions on Canvas.

### Lab Format

Though the exercises are called "labs," they involve not only measurements and analyses of biological materials, but models, computer simulations, computer-based problem analysis, and hypothetical data. In this way, most of the sessions will be "tutorials." Lab exercises, most of which include a pre-lab assignment, a lab report, and a 'puzzle' based on the exercises and concepts of the lab will account for 32.8 % of your overall BI 281H grade; the remaining 67.2% comes from pre-lecture quizzes, clickers, the midterms, and the final exam.

### **Components**

**Pre-Labs** (beginning week 2): These *asynchronous* assignments will generally contain a short video followed by several questions to *prime you* for the lab activities. We expect you to have completed these before lab. Each pre-lab is worth 5 points and will be available from Thursday at 4pm until the following Tuesday at 9am (7 total; 3.5% of your grade). If anything is confusing, feel free to come to office hours for help on these.

Labs and Lab reports (beginning week 1): Each student will attend their *synchronous* lab section in person in Klamath 33. During these sessions, you will work in pairs on the lab. Each week we will provide you with a pdf of the lab, you will be required to print these and bring them with you to lab (in lieu of buying a packet at the bookstore; we will print the first week for you). Our goal is that each student can leave their section with a close to (if not fully) completed lab report. Reports must be complete, legible, and written in your own words. Even though lab reports are graded and submitted individually, we expect and encourage you to cooperate with your colleagues! We understand that illnesses may arise so if you are unable to attend your section please email me (Laurel-lpfeife1@uoregon.edu) *before* your section and we will ask that

you come to a different section (or arrange an alternative assignment if you are quarantining). There are 8 labs this term (weeks 1-6, 8, 10). There are no labs during the Veterans Day holiday (week 7) or during Thanksgiving week (week 9). Each lab report is worth 20 points (16% of your grade) and due the following week at the *beginning* of your lab section.

Lab Puzzles (beginning week 2): These *asynchronous* assignments are another opportunity for you to demonstrate what you learned during the previous weeks lab. These will become available on the Friday after lab (beginning week 2) and due the following Monday at midnight. These 'puzzles' will ask you to apply the concepts covered during lab to novel applications/concepts. They are open book, open note, and open friend and a lower stake opportunity to prepare for the materials that will be asked about on the midterm and final. Once you begin the puzzle you will have 120 minutes to complete it, but you may take it anytime between Friday afternoon and Monday at midnight. We encourage you to create study groups to work with while taking the puzzle, but be sure that everyone in the group understands why you are answering the way you are. There are 6 lab puzzles (no puzzle for weeks 1 or 10) worth 20 points each; the lowest score will automatically be dropped thus puzzles are worth 10% of your grade.

Lab Courtesy. Please arrive to lab on time wearing a properly fitting mask. Late arrivals distract me and the other students. Upon arrival, wash your hands and write your preferred name/pronouns on the name tag provided. No food or drink are allowed in the lab. Use your laptop/phones only for class activities. Ask questions if you did not hear or understand something. Clean-up after yourself (following the clean-up protocols listed); erase your name tags and white boards. As an incentive there is a small participation component to your overall lab grade worth 3.3%. You will not be penalized if you need to miss lab due to illness as long as you've communicated clearly with me within 24 hours to arrange an alternative assignment.

Class rosters are provided to us with your legal name. We will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the quarter (or before) so that we may address you properly.

Open inquiry, freedom of expression, and respect for differences are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities. Classroom courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Our remote classroom is a learning environment, and as such should be a safe, inclusive and respectful place. Being respectful also includes using preferred pronouns for your classmates. Disrespecting fellow students as well as combative approaches, tones and/or actions are not acceptable. Please make me aware if there are classroom dynamics that impede your (or someone else's) full engagement.

**Crises happen.** If you are having problems that are interfering with your ability to do the work in this class, please let me know promptly. I am willing to make arrangements when the need is real and when you have done your best to deal with the situation in a timely manner. Make this request in writing to me (lpfeife1@uoregon.edu), preferably ahead of time.

**Academic integrity.** We expect students to complete assignments and exams in a manner consistent with academic integrity as outlined in the Student Conduct Code:

https://policies.uoregon.edu/vol-3-administration-student-affairs/ch-1-conduct/student-conduct-code. This includes cheating ("any act of deception by which a student misrepresents or misleadingly demonstrates that the student has mastered information on an academic exercise that the student has not mastered"), and plagiarism ("using the ideas or writings of another as one's own.") Finally, you do not have permission to post any course related material on outside private or public websites (i.e. coursehero, chegg, groupme, etc.). I have a zero tolerance policy for academic dishonesty. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures.

**Discrimination and Harassment**: Any student who has experienced sexual assault, relationship violence, sex or gender-based bullying, stalking, and/or sexual harassment may seek resources and help at safe.uoregon.edu. To get help by phone, a student can also call either the UO's 24-hour hotline at 541-346-7244 [SAFE], or the non-confidential Title IX Coordinator at 541-346-8136. From the SAFE website, students may also connect to Callisto, a confidential, third-party reporting site that is not a part of the university. Students experiencing any other form of prohibited discrimination or harassment can find information at respect.uoregon.edu or aaeo.uoregon.edu or contact the non-confidential AAEO office at 541-346-3123 or the Dean of Students Office at 541-346-3216 for help.

**Reporting:** I am a Student-Directed Employee. As such, if you disclose to me, I will respond to you with respect and kindness. I will listen to you, and will be sensitive to your needs and desires. I will not judge you. I will support you. As part of that support, I will direct students who disclose sexual harassment or sexual violence to resources that can help. I will only report the information shared to the university administration when you as the student requests that the information be reported (unless someone is in imminent risk of serious harm or is a minor). Please note the difference between 'privacy' and 'confidentiality.' As a Student-Directed Employee I can offer privacy because I am not required to report certain information to the university. However, I cannot be bound by confidentiality in the same way that a counselor or attorney is. Confidential resources such as these means that information shared is protected by federal and state laws. Any information that I as a student-directed employee receive may still be accessed by university or court proceedings. This means, for example, that I could still be called as a witness or required to turn over any related documents or notes that I keep.

Please note also that I am required to report all other forms of prohibited discrimination or harassment to the university administration. Specific details about confidentiality of information and reporting obligations of employees can be found at titleix.uoregon.edu. UO employees, including faculty, staff, and GEs, are mandatory reporters of child abuse. Child abuse pertains to individuals who are under the age of 18. This statement is to advise you that your disclosure of information about child abuse to the instructor may trigger my duty to report that information to the designated authorities.