Foundations Of Biochemistry (BIOL335)

Spring 2022

Section 3: Mon, Wed, Fri: 1.30-2.20pm

Instructor information

Dr. Travis Bailey
Office: ISC350
Office Hours: Wednesdays 10:30 – 11:20 am and Thursdays 3:30 – 5:20 pm
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Required Textbook

Achieve for Biochemistry ISBN: 9781319402815 with Biochemistry: A Short Course, 4th Edition by Tymoczko, Berg, Gatto and Stryer

Optional ISBN: 9781319425562 comes with loose leaf copy of the textbook.

Course Description

This course will introduce the principles of biochemistry to students who have a strong interest in biology. The course is a one semester survey of the chemistry of living organisms that will focus on metabolic regulation and pathway integration. It will also incorporate elements of molecular evolution as it relates to protein structure/function.

Learning Objectives

Students who complete this course successfully will be able to:

- Describe the basic facts, concepts, and fundamental principles of cellular metabolism.
- Describe how the structure of a protein affects its function and explain how this chemistry relates to cellular metabolism.
- Describe the structures of hemoglobin and myoglobin and how oxygen binding is altered due to their different structures and by the presence of other chemicals.
- Interpret data of enzyme kinetics on substrates with and without enzyme inhibitors.
- Describe common types of catalytic strategies enzymes use to accelerate reactions and important regulatory strategies that control enzyme activity.
- Describe the essential features of signal transduction pathways and their importance in cellular metabolism.
- Describe glycolysis, citric acid cycle and oxidative phosphorylation and how ATP is generated. Describe the coordinated regulation of glycolysis and gluconeogenesis.
- Describe glycogen and fatty acid metabolism
- Analyze how human diseases alter metabolism as well as potential treatments.

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 quarter 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 20 minutes.

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 30 minutes you will first answer questions on your own. Then, you will immediately have 20 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.

Achieve Assignments

Assignments will count toward a very large part of your grade. I will be asking you to accomplish many assignments per week. Some work is "graded" so that you can check your knowledge but will not be calculated in your grade (below in green text).

- The Reading quiz in "Achieve" helps to ensure you can see if you are accidentally reading past important concepts when preparing for lecture. You are not graded for this work. You are welcome to use you book while you answer the questions. Please feel free to ask questions during lectures to help you with any assignments.

- Case Studies are ungraded practice of the concepts and are most like the kinds of questions I ask on a test. They are graded in Achieve, but not calculated in your grade.

- Adaptive quizzes: You finish the quiz when you earn enough points. The more quickly you answer questions correctly the sooner you can earn full credit. This means you can both answer many questions wrong on first attempt and yet earn 100% by answering more questions. Please use your notes and book.
    - Adaptive quiz deadlines are firm. If you don't complete the assignment by the due date, you will receive no credit. Please start early.
- Homework questions: Unlike Adaptive quizzes, homework questions require you to answer correctly, or you lose 20% per wrong attempt. There is no limit to attempts. Late work is penalized 20% per day.
- The lowest 10% assignment scores will be dropped before calculation of the final grade.

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.

Course Evaluation

Exams (4 total, 100 points each)	400
Graded Achieve Assignments	50
Group Assignments	50
Total points	500

Grading Scale

The following scale will be used to calculate final grades.
Rounded to the first decimal.

A = 100-93%	A^- =92.9-90%	B^+= 89.9-87%	B = 86.9-83%
B -= 82.9-80%	C^+ = 79.9-77%	C = 76.9-73%	C- = 72.9-70%
D = 69.9-60%	F = 59-0%		

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 Achieve and Group Assignments.
- 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.
- Even though the exams are open-notes, study as if they were closed-notes exams. You will not have time to go through your notes and find the correct answers to every question during the timed exam period.
- 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.

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.

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.

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Note on letters of recommendation: Many students ask a letter of recommendation because this class gives opportunity to consider your critical thinking and lab attentiveness 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.

Tentative schedule

The following is the planned schedule subject to potential alterations.

Week 1

Date	Class #	Topic	Chapter
26-Jan Wed	1	Biochemistry and the Unity of Life	1
28-Jan Fri	2	Water, Weak Bonds, and the Generation of Order out of Chaos	2

Week 2

31-Jan Fri	3	Amino Acids	3
2-Feb Wed	4	Protein Three-Dimensional Structure	4
4-Feb Fri	5	Techniques in Protein Biochemistry	5

Week 3

7-Feb Mon	6	Basic Concepts of Enzyme Action	6
9-Feb Wed	7	Enzyme Kinetics and Regulation	7
11-Feb Fri	8	Enzyme Mechanisms and Inhibitors	8

Week 4

14-Feb Mon	9	Group Homework 1	1-8
16-Feb Wed		*Diversity Summit: No Classes*	
18-Feb Fri	10	Discussion	1-8

Week 5

21-Feb Mon	11	Midterm 1	1-8
23-Feb Wed	12	Hemoglobin an Allosteric Protein	9
25-Feb Fri	13	Carbohydrates	10

Week 6

28-Feb Mon	14	Lipids	11
2-Mar Wed	15	Membrane Structure and Function	12
4-Mar Fri	16	Signal Transduction Pathways	13

Week 7

7-Mar Wed	17	Digestion: Turning a Meal into Cellular Biochemicals	14
9-Mar Fri	18	Metabolism: Concepts and Design	15

11-Mar Mon	19	Group Homework 2	
14-18 Mar All Week		Spring Break	
Week 8			
21-Mar Mon	20	Discussion	
23-Mar Wed	21	2	9-15
25-Mar Fri	22	Glycolysis	16
Week 9			
28-Mar Mon	23	Glycolysis	16
30-Mar Wed	24	Gluconeogenesis	17
1-Apr Fri	25	Preparation for Citric Acid Cycle	18
Week 10			
4-Apr Mon	26	Harvesting Electrons from Citric Acid Cycle	19
6-Apr Wed	27	The Electron-Transport Chain	20
8-Apr Fri	28	The Proton-Motive Force	21
Week 11			
11-Apr Mon	29	Glycogen Degradation	24
13-Apr Wed	30	Glycogen Synthesis	25
15-Apr Fri	31	Group Homework 3	

Week 12

18-Apr Mon	32	Discussion	
20-Apr Wed	33	3	16-21, 24,25
22-Apr Fri	34	Pentose Phosphate Pathway	26

Week 13

25-Apr Mon	35	Fatty Acid Degradation	27
27-Apr Wed	36	Fatty Acid Degradation	27
29-Apr Fri	37	Fatty Acid Synthesis	28

Week 14

2-May Mon	38	Lipid Synthesis: Storage Lipids, Phospholipids, and Cholesterol	29
4-May Wed	39	Lipid Synthesis: Storage Lipids, Phospholipids, and Cholesterol	29
6-May Fri	40	Amino Acid Degradation and the Urea Cycle	30

Week 15

9-May Mon	41	Group Homework 4	
11-May Wed	42	Discussion	

Week 16

18-May Wed	noon	Final	26-30