FOUNDATIONS OF BIOCHEMISTRY (BIOL335)
SPRING 2025
Mon, Wed, Fri from 10.30am-11.20am, Newton 212

Instructor information

Dr. Varuni Jamburuthugoda
Office: ISC 355
Office Hours: Mon, Wed, Fri from 9.15-10.15am
Email: jamburuthugoda@geneseo.edu
Office phone: 585-245-5315

Required Textbook

Biochemistry, 10th Edition by Berg, Tymoczko, Gatto and Stryer with online Achieve.
ISBN: 9781319417475

Course Description

- The main goal of this course is to allow you to learn and understand the concepts of biological metabolism and to apply these concepts to human diseases. The lectures will usually follow the textbook. The PowerPoint slides are posted on Canvas before each lecture. Please remember that slides are just a guideline for you to study and you are supposed to refer to your textbook to have a thorough understanding of the topics. I will also post questions to answer as you read the textbook to help you guide. I encourage you to interrupt me at any time during the lectures if you have a question or need clarification. That being said, I expect that most questions will come up when you review the material after the lectures. Therefore, we will start each class with a few minutes of questions from you and others. I will also ask questions during class. Always think along and be prepared to suggest an answer and justify it.

Learning Objectives

Students who complete this course successfully will be able to:

- Describe the basic facts, concepts and fundamental principles of cellular metabolism.
- Describe protein structure and function and explain how it relates to cellular metabolism.
- Describe the structures of hemoglobin and myoglobin and how its related to their distinct functions.
- Describe basic concepts in enzyme kinetics and different types of enzyme inhibitors.
- Describe different types of catalytic strategies used by enzymes to accelerate particular reactions and different types of regulatory strategies used by enzymes to regulate enzymatic 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. Be able to understand the integration of metabolism with regard to human diseases.

Course Evaluation

Graded Work	Contribution
4 Exams (each 20%)	80%
Assignments Achieve End of the Chapter Problems (10%) Case studies (10%)	20%

Overview of Evaluation

Exams (80%)

- There will be four exams, each covering roughly one fourth of the course and consisting of multiple choice, true/false, fill in the blank and short answer questions and will challenge you to integrate and apply what you have learned in class.
- All four exams will NOT be comprehensive but cover only the material between each exam as outlined in the syllabus. Please note that although the material is not comprehensive you will not succeed in learning later topics if you have not mastered earlier topics. You should utilize the relevant chapters of the textbook to strengthen your understanding of what we cover in class but if it has not been mentioned in the lectures, PowerPoint slides or assigned reading you will NOT be tested on it.

Achieve End of Chapter Problems (10%)

- Achieve end of the chapter problems will be assigned after each chapter. These homework quizzes will help you prepare for the exams. You have unlimited attempts per question with a 5% penalty.
- Be sure to pay close attention to deadlines; there will be no make-up assignments without a serious and compelling reason and instructor approval. Two lowest end of the chapter problem grades will be dropped.

Case studies (10%)

- Case studies will be comprised of questions related to the case studies. These assignments will be completed in groups, and one copy will be turned in per group.
- Each person will be graded by peers for contribution to group work and 50% of these grades will be based on peer evaluations.

Late Work

- Late work will not be accepted. Assignments will not be available after the deadline. If you have an extenuating circumstance, please email me before the assignment is due to make alternate arrangements.

Makeup Exam policy

- I will not makeup exams unless you have a valid excuse such as an illness or a family emergency. To be fair to everyone in class and to follow departmental and university policies, documentation for such emergencies will be required.

- If you miss an exam for any of the above stated exceptions, you must contact me as soon as possible to make alternate arrangements.

Grading Scale

- The following scale will be used to calculate final grades.

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:

- Go over the PowerPoint slides and read the assigned pages from each chapter before class.
- Be alert and take good notes. Go over your notes after class and make extra notes from your reading.
- Take charge of your own learning. Study for understanding of the concepts, not just memorization of facts.
- Consider studying with other students or your group members to discuss the material and prepare for the exams.
- Try the adaptive quizzes in Achieve. They carry no additional credit and do not affect your grade, even if you do not complete them. Instead, their role is to provide targeted extra practice tailored to your needs.
- Get help when necessary. Feel free to email me anytime and I will be happy to help.

Accessibility

- SUNY Geneseo is dedicated to providing an equitable and inclusive educational experience for all students. The Office of Accessibility will coordinate reasonable accommodations for persons with documented physical, emotional, or cognitive disabilities, as well as medical conditions related to pregnancy or parenting.
- Students with letters of accommodation should submit a letter to each faculty member at the beginning of the semester and discuss specific arrangements. 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 need additional 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.
- Students are expected to adhere to the University's policy on academic dishonesty and plagiarism, located in the handbook. Academic dishonesty and plagiarism have serious consequences, and if you're struggling, please ask for help rather than resort to dishonesty! Academic dishonesty will result in a zero on the assignment or exam. In addition, a report will be filed to the department chair and Dean of the College, and a record of academic dishonesty will be placed in the student's file at the Dean of Students Office.

Copyright Notice

- Many of the materials that are provided to students in this course have been created by Dr. Jamburuthugoda, or by the publisher of our textbook. Reproduction of the course material *other than for your personal use* is prohibited without the author's consent. © 2020 Varuni Jamburuthugoda. Thus, students are prohibited from sharing or posting copyrighted material to any websites outside our course Canvas site. This includes but is not limited to sites such as StudyBlue: www.studyblue.com Course Hero: www.coursehero.com Studysoup: www.StudySoup.com Chegg Study: www.chegg.com Oneclass: www.oneclass.com Gradebuddy: www.gradebuddy.com Quizlet: www.quizlet.com Students are also prohibited from reproducing material to be shared with other more limited groups (eg. sorority/fraternity test bank). Be aware that UUP (Union of University Professionals, the union representing faculty on this campus) is seeking to take legal action against these and other sites, and that posting or selling copies of materials to such sites may put a student in legal jeopardy.

Week 1

Date	Lecture	Topic	Chapter
1/22	**1**	Introduction	**1**
1/24	**2**	Protein Composition & Structure: Amino Acids	**2**

Week 2

Date	Lecture	Topic	Chapter
1/27	**3**	Protein Composition & Structure: Peptide Bonds	**2**
1/29	**4**	Protein Folding, Misfolding and diseases	**2**
1/31	**5**	Protein Purification **Chapter 2: End of Chapter Problems due**	**3**

Week 3

Date	Lecture	Topic	Chapter
2/3	**6**	Exploring Proteins & Proteomics- II	**3**
2/5	**7**	Exploring Proteins & Proteomics- III	**3**
2/7	**8**	Hemoglobin and Myoglobin-Oxygen Binding Curves **Chapter 3: End of Chapter Problems due** ***Case study -1 Answers due***	**7**

Week 4

Date	Lecture	Topic	Chapter
2/10	**9**	Hemoglobin: Bohr Effects & Mutations	**7**
2/12	Exam 1 Review **Chapter 7: End of Chapter Problems due**		
2/14	**Exam 1 (Lectures 1-9)**		

Week 5

Date	Lecture	Topic	Chapter
2/17	**10**	Enzymes: Protein Catalysts & Thermodynamics	**8**
2/19	**11**	Enzyme kinetics	**8**
2/21	**12**	Enzyme Inhibition	**8**

2/21		**Chapter 8: End of Chapter Problems due**	

Week 6

Date	Lecture	Topic	Chapter
2/24	**13**	Catalytic Strategies -Proteases	**9**
2/26	**14**	Catalytic Strategies-Carbonic Anhydrases & Restriction Enzymes	**9**
2/28	**15**	Catalytic Strategies: Myosins Regulatory Strategies: Allosteric & Isozymes **Chapter 9: End of Chapter Problems due**	**9** **10**

Week 7

Date	Lecture	Topic	Chapter
3/3	**16**	Regulatory Strategies: Covalent Modification & Proteolytic Cleavage	**10**
3/5	**17**	Carbohydrates Exam 2 Review **Chapter 10: End of Chapter Problems due**	
3/7	**Exam 2 (Lectures 10-17)**		

Week 8

Date	Lecture	Topic	Chapter
3/10	**18**	Signal Transduction	**14**
3/12	**19**	Insulin Signaling Pathway	**14**
3/14	**20**	Metabolism: ATP and Oxidation of Carbon Fuels **Chapter 14: End of Chapter Problems due**	**15**

Week 9

Date	Lecture	Topic	Chapter
3/15 to 3/22	**Spring Break**		

Week 10

Date	Lecture	Topic	Chapter
3/24	**21**	Metabolism-Common Motifs	**15**
3/26	**22**	Glycolysis	**16**
3/28	**23**	Alcoholic Fermentation **Chapter 15: End of Chapter Problems due**	**16**

Week 11

Date	Lecture	Topic	Chapter
3/31	**24**	Regulation of Glycolysis	**16**
4/2	**25**	Gluconeogenesis	**16**
4/4	**26**	Citric Acid Cycle-part 1 **Chapter 16: End of Chapter Problems due**	**17**

Week 12

Date	Lecture	Topic	Chapter
4/7	**27**	Citric Acid Cycle-part 2	**17**
4/9	Exam 3 review **Chapter 17: End of Chapter Problems due**		
4/11	**Exam 3 (Lectures 17-27)**		

Week 13

Date	Lecture	Topic	Chapter
4/14	**28**	Oxidative Phosphorylation part 1: Redox Potential & Electron Transport Chain	**18**
4/16	**29**	Oxidative Phosphorylation-part 2	**18**
4/18	**30**	Oxidative Phosphorylation-ATP Synthesis **Chapter 18: End of Chapter Problems due**	**18**

Week 14

Date	Lecture	Topic	Chapter
4/21	**31**	Glycogen Metabolism-Glycogen Breakdown & Regulation ***Case study 2 answers due***	**21**
4/23	***G.R.E.A.T Day***		
4/25	**32**	Glycogen Metabolism-Glycogen Synthesis & Regulation **Chapter 21: End of Chapter Problems due**	**21**

Week 15

Date	Lecture	Topic	Chapter
4/28	**33**	Fatty Acids	**22**
4/30	**34**	Fatty Acid Metabolism-Beta Oxidation and Ketone Bodies	**22**
5/2	**35**	Fatty Acid Metabolism-Fatty Acid synthesis **Chapter 22: End of Chapter Problems due**	**22**

Week 15

Date	Lecture	Topic	Chapter
5/5	**36**	Integration of Metabolism-Caloric Homeostasis, Diabetes	**27**
5/7	**37**	Integration of Metabolism- Food & Exercise ***Case study 3 Answers due***	**27**

Date	
5/14	**Final Exam (Lectures 28-37)**