CHEMISTRY 341: General Biochemistry

Term: Spring, 2019

Class time: 10:30 – 11:45 a.m. Tuesdays, Thursdays

Class location: Science Hall II Rm 243

Instructor: Dr. Kambiz Hamadani

Inst. Office: Science II-331

Inst. Office hours: TTh 12:00 – 1:00 p.m. or by appointment

Inst. Phone: (760)750-4189

Inst. E-mail: khamadani@csusm.edu (only to be used for sensitive/personal/emergency communications… for all other questions regarding course content, materials, logistics please use our course peer discussion forum—see below).

Prerequisites: One semester of Organic Chemistry (CHEM 201) and two semesters of General Chemistry (CHEM 150/160) or equivalent with minimum grades of C.

Course Objective: Intended for biological science, biotechnology, and chemistry majors. The objective of this course is to introduce the student to the fundamental concepts and language of biochemistry, and to the principles that govern the structure and behavior of water, amino acids, proteins, carbohydrates, lipids, and nucleotides. Also covered are basic enzyme kinetics, mechanisms of enzyme action, and enzyme regulation; the principles of bioenergetics and metabolism; the generation, use, and storage of metabolic energy; the synthesis and degradation of bio-molecules, and the regulation of metabolism.

Student Learning Outcomes:

In this course students will demonstrate their understanding by recalling, explaining, applying, and integrating their knowledge of:

1. the various interactions and forces that help maintain the structures of the four major classes of biological macromolecules (proteins, nucleic acids, carbohydrates, and lipids).
2. the basic principles of thermodynamics and kinetics as they apply to biochemical processes.
3. the metabolic pathways used by biological systems to extract energy from their surroundings and how high energy molecules and electrochemical gradients are used to store this chemical potential energy for future use.
4. how conformational changes are used for biochemical sensing, response, signaling, regulation, and catalysis in living systems.

These are course-level learning outcomes. Students are responsible for everything we discuss in class, all assigned reading from the textbook, and everything included in the lecture notes. Students are also encouraged to examine the American Chemical Society (ACS), American Society for Biochemistry and Molecular Biology (ASBMB), and the Medical College Admissions Test (MCAT) biochemistry course guidelines for a more detailed list of concepts, topics, and learning goals aligned toward their specific long-term career/educational goals.

Textbook (Required): Biochemistry: A Short Course, 1st Ed. (2010), 2nd Ed. (2013), or 3rd Ed. (2015) Tymoczko, Berg & Stryer, W.H. Freeman & Co. **2 copies of the textbook are also on reserve at the library.**

Cougar Courses: The course website can be accessed via cougar courses. The following will be available or done through the site:

(i). Posting of all assignments and due dates.
(ii). General communications with the instructor (make sure you are receiving the "test message" sent at the beginning of the semester).
(iii). The syllabus.
(iv). Lecture notes/video links.
(v). Peer Discussion/Voicethread Forums for asking questions.
(vi). Online Quizzes
(vii). Experience points submissions.

If you are not already familiar with the use of Cougar Courses please consult the IITS help desk or the instructor as soon as possible.

Lecture Notes: PDF files with lecture slides will be available online via Cougar Courses. It is highly recommended that you print a copy of these files and bring it to class with you, so that you add notes to them. Some lectures contain up to 40-50 slides, and therefore, it may be beneficial to print more than one slide per page (4 or 6 slides per page works well). These lecture notes should not be considered a substitute for attending class or reading the textbook. These slides are not comprehensive lecture notes. You will notice that the lecture slides contain more textbook figures and bullets with key words than text. They are intended to serve as a starting point for my lectures and as a guide for your reading of the textbook.

Topic Schedule: Given below is the topic list for CHEM 341. Although every attempt will be made to adhere to this list the instructor reserves the right to adjust the time spent on each topic, the order of the topics, and the dates of the exams. Please note that the readings highlight the most important sections from the textbook that are covered in the course. NOT ALL TOPICS COVERED IN EACH CHAPTER OF THE TEXTBOOK ARE COVERED AND EMPHASIZED IN LECTURES/EXAMS.

Date	Chp	Topic	Reading Notes	
			Emphasized	**Not Covered**
Wks 1-3	1	Biochemistry and the Unity of Life.		
	2	Water, weak bonds, & order vs. chaos	2.3-2.5	
	3	Amino acids		3.3
	4	Protein 3D structure	4.1-4.4	
	5	Techniques in Protein Biochemistry		5.1, 5.3-5.4
2/12		**1st Mid-Term Examination**		
Wks 4-6	6	Basic concepts of enzyme action	6.3-6.4	
	7	Kinetics and Regulation	7.1-7.4	
	8	Mechanisms and inhibitors	8.1-8.3	
	9	Hemoglobin an allosteric protein	9.1-9.4	
3/5		**2nd Mid-Term Examination**		
Wks 7-10	10	Carbohydrates		
	11	Lipids		
	12	Membrane Structure & Function	12.5	
	13	Signal-Transduction Pathways	13.2	13.3, 13.6,
	14	Digestion: From Meals into Molecules		
	15	Metabolism: Basic Concepts & Design	15.1-15.5,	
	16	Glycolysis	16.1-16.2,16.4	16.3, 16.5,
4/9		**3rd Mid-Term Examination**		
Wks 11-13	17	Gluconeogenesis	17.1	17.3
	18	Preparation for the cycle	18.1	18.2
	19	Harvesting electrons from the cycle	19.1-19.3,	19.5
	20	The electron transport chain	20.1-21.2	
	21	The proton motive force		
4/30		**4th Mid-Term Examination**		

Wks. 14-15	24.1, 24.3 25.1 26.1-26.3 27.1-27.4 28.1 30.1-30.2	Glycogen Degradation Glycogen Synthesis The Pentose Phosphate Pathway Fatty Acid Degradation Fatty Acid Synthesis Amino Acid Degradation and Urea Cycle		24.2 25.2 28.2-28.4 30.3
Wk 15		Final Review Session		

Exams: There will be (4) mid-term exams and a comprehensive final exam (which includes content from the last section). None of the exams will be returned. Exams will consist of Multiple Choice and free response questions. Bring a Scantron and calculator to each exam. Students who have accrued enough XP points to achieve "Master Biochemist" status may drop the lowest of their mid-term scores.

The final exam is scheduled for Wednesday May 15th from 7:00am to 9:00am in our normal classroom. Note the time of the final is different from our normal class time. Students who have accrued enough XP points to achieve "Biochemistry Wizard" status may drop either a mid-term exam grade OR their final exam grade.

Make up exams will only be given if you have a valid and serious excuse (severe illness, death in the family, etc.).

In-class assessments: We will use PollEverywhere for in-class assessments throughout the semester. Please make sure to have a mobile phone with text messaging or internet access available for each lecture (a computer will also work). To register and link your account and phone to our class please follow the instructions that will be sent to you via e-mail from Polleverywhere (check your spam box if you don't see the invite immediately). Use the link sent to you in this e-mail to register using your name, CSUSM e-mail, and the phone number you will be responding from so that your answers are recorded properly for grading purposes. The following question will be open prior to our first lecture. If you will be using a phone without logging into your polleverywhere account through the internet during class then you'll definitely need to certify your phone number (a text will be sent to your phone to verify your phone number once it's been entered into the system). Once done please respond to this test poll prior to the start of class to ensure your responses are being registered: "Is you're poll everywhere responder working? Repond at **Pollev.com/hamadani** or **Text HAMADANI** to **37607** once to join then "A" for Yes or "B" for No to answer the poll. Your PollEverywhere responses will get you XP points both for submitted but incorrect answers and for submitted correct answers so make sure 1). you come to class, 2). you bring your phone, 3). that it's registered, and 4). that you come prepared to learn actively.

Online Quizzes: There will be a series of quizzes (one per chapter) administered through cougar courses. The quizzes will be made available until the Sunday following our coverage of the material. You will have 5 minutes to complete each quiz. You will be allowed to attempt each quiz once. Students who have accrued enough XP points to achieve "Apprentice Biochemist" status will be granted additional attempts on each chapter quiz in one section of the course. Students who have accrued enough XP points to achieve "Journeyman Biochemist" status will be granted additional attempts on all chapter quizzes in the course You must complete the quizzes as we go through the material otherwise you will receive no points so keep up with the readings.

Virtual Lab Exercises: Since this course has no laboratory associated with it we will be using virtual laboratory exercises to illustrate some of the concepts covered in the course. You must complete 80 course points worth of virtual lab activities throughout the

semester. There is a $40 cost for the licenses. Anyone that can't afford this fee can contact me with an explanation of their special circumstances and I will try to get you a voucher (a maximum of 5-6 students will be eligible for this). You will need to register and pay for the license by following the link sent to your csusm e-mail address and:

1. Following these instructions. Use your csusm e-mail address to register.
2. Enter our course code: CC7IH8N490

In case of any issues, please visit Labster's Help Center to learn more about minimum computer requirements and troubleshooting (cache clearing).

After signing in, you should see all Labster Labs (see below) and be able to start the simulations. This semester one of the labs (Cellular Respiration) can be completed in either a 2D or a 3D immersive format. 3D VR hardware will be available for check-out from the student help desk in the library or during Office Hours. All 2D labs can be completed using a standard computer with internet access.

Simulation Name	Type	Associated Chapters
Protein Denaturation	2D	4
Enzyme Kinetics	2D	7, 18
Carbohydrates	2D	10, 14, 15, 16
Cellular Respiration	2D	20
Cellular Respiration (must reserve/check-out equipment from Student Help Desk)	3D	20

Ways to earn Experience Points (XPs) and course badges: One week prior to each midterm, XP points will be tallied up and badges will be dolled out along with benefits (i.e. additional quiz attempts, the possibility of dropping a mid-term, or the final). You can earn XP points by:

1. simply coming to class and submitting responses to the in-class polls.
2. Improving your own or another student's scores on mid-terms (Study-Buddy system)
3. Completing end-of-chapter homework assignments and submitting them via Turn-it-in after we complete each chapter in class.
4. Participating regularly in the Voicethread Online Discussion Forums prior to each midterm.
5. Completing the Workbook problems and submitting them via turn-it-in.

Course Badges and values are:
Apprentice Biochemist status requires 100 XP points.
Journeyman Biochemist status requires 200 XP points
Master Biochemist status requires 300 XP points
Biochemistry Wizard status requires 400 XP points

Practice Problems: Textbook homework problems for each chapter will be posted. These problems will be collected via turn-it-in and graded for completion to award XP points. It is strongly recommended that you do these problems in preparation for the exams. Practice exams are also posted.

Grades:

Midterm 1	**55 points**	**11%**
Midterm 2	**55 points**	**11%**
Midterm 3	**55 points**	**11%**

Midterm 4	**55 points**	**11%**
Online Quizzes	**100 points**	**20%**
Virtual Lab Exercises	**80 points**	**16%**
Final Exam	**100 points**	**20%**
Total	**500 points**	**100%**

Letter grades will then be distributed according to the table below after rounding to the nearest whole percentage point.

Grade Percentage	Grade
>92%	A
90 – 92%	A-
88 – 90%	B+
82 – 88%	B
80 – 82%	B-
78 – 80%	C+
70 – 78%	C (no C- grades are given)
68 – 70%	D+
62 – 70%	D
60 – 62%	D-
60% and below	F

Academic Honesty Policy
As required by the Student Academic Honesty Policy students will be expected to adhere to standards of academic honesty and integrity, as outlined in the Student Academic Honesty Policy. All written work and oral presentation assignments must be original work. All ideas/material that are borrowed from other sources must have appropriate references to the original sources. Any quoted material should give credit to the source and be punctuated with quotation marks. Students are responsible for honest completion of their work including examinations. There will be no tolerance for infractions. If you believe there has been an infraction by someone in the class, please bring it to the instructor's attention. The instructor reserves the right to discipline any student for academic dishonesty, in accordance with the general rules and regulations of the university. Disciplinary action may include the lowering of grades and/or the assignment of a failing grade for an exam, assignment, or the class as a whole. Incidents of Academic Dishonesty will be reported to the Dean of Students. Sanctions at the University level may include suspension or expulsion from the University

Disabled Students Policy
Students with disabilities who require reasonable accommodations must be approved for services by providing appropriate and recent documentation to the Office of Disability Support Services (DSS). This office is located in Craven Hall 4200, and can be contacted by phone at (760) 750-4940. Students authorized by DSS to receive reasonable accommodations should meet with me in office hours to ensure confidentiality.

Writing Requirement:
The University Writing Requirement will be satisfied upon completion of this course.

Use of Electronic Devices:
The use of cell phones, PDAs, or any other electronic device during exams is not allowed. Scientific calculators are permitted.

Classroom/Forum Behavior and Student Code of Conduct:
Students are expected to respect and follow standards of student conduct while in class, on student discussion forums, and on the campus. As your instructor, I have the following expectations concerning your behavior in class on online:

1. Promote a courteous learning atmosphere by exhibiting mutual respect and consideration of the feelings, ideas, and contributions of others.
2. Practice consideration for others by maintaining a clean and orderly classroom.

3. Recognize everyone's opportunity to contribute information in a relevant and meaningful manner by not monopolizing discussions, interrupting, or interjecting with irrelevant, illogical or inappropriate questions or comments.
4. Do not dominate class discussions—give others a chance to contribute.
5. If you must eat in class do so discreetly.