

CHEMISTRY 341: General Biochemistry

Term: Fall, 2018
Class time: 5:30 – 6:45 p.m. Tuesdays, Thursdays
Class location: University Hall 100
Instructor: Dr. Kambiz Hamadani
Inst. Office: Science II-331
Inst. Office hours: TTh 4:00 – 5:30 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-to-Peer Discussion Forum for asking questions.
- (vi). Online Quizzes

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
9/13		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	
10/4		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,
11/1		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		
11/27		4th Mid-Term Examination		

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

The final exam is scheduled for Tuesday December 11th from 6:15pm to 8:15pm in our normal classroom. Note the time of the final is different from our normal class time.

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 you must click on a registration link that was or will be sent to your campus e-mail prior to our first class day. Use this link to register using your name 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.

Class participation: Your PollEverywhere responses will be used to grade your attendance and classroom participation so make sure 1). you come to class, 2). you bring your phone, and 3). that it's registered.

Online Quizzes: There will be a series of quizzes (one per chapter) administered through cougar courses. The quizzes will be made available until the Monday following our coverage of the material or until the next midterm. You will have 5 minutes to complete each quiz. You will be allowed to attempt each quiz twice (the questions will be different). The highest quiz score will count towards your grade. Your score on the lowest quiz will be dropped. 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 40 points worth of virtual labs throughout the semester. There is a \$45 cost for a semester license to these virtual labs. 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:

1. Following these [instructions](#).

2. Enter our course code: CCQOGHVPT3

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 and be able to start the simulations. This semester I'm allowing each student to choose which labs they would like to complete based on their interests. Only once during the semester will I allow you to reattempt the same lab for a better grade so make sure you're using a computer that meet the specs and won't freeze up during a run (use library computers if necessary). Some labs are more pertinent than others to the content in our course but I still want to give you the freedom to explore content that interests you. Thus I've classified the labs that are most pertinent to our class by giving them a higher maximum point total. If you score 100% on all the labs and take exactly 45 points worth of labs you will get 100% of the points possible for the virtual labs portion of the course. You can, however still get 100% of the points by taking 90 points worth of labs and scoring 50% on them (more work perhaps but you get to explore more and there's less stress on getting every point). The labs and max points are given below. Labs that are more "chemistry oriented" are listed in italics.

Simulation Name (course relevance/points)	Simulation Name (course relevance/points)	Simulation Name (course relevance/points)
Enzyme Kinetics (10)	Smooth Muscle/Electrophysiology (4)	RNA Extraction (2)
Cellular Respiration (9)	Photosynthesis (4)	FACS (2)
Carbohydrates (8)	Fermentation (4)	Genetically Engineered Machine (2)
Protein Denaturation (7)	ELISA (4)	Microscopy (2)
Protein Synthesis (7)	<i>HPLC (4)</i>	Medical Genetics (2)
Parkinson's Disease (7)	Electron Transport Chain (4)	Pipetting (2)
Diabetes (7)	Polymerase Chain Reaction/CSI (3)	Eutrophication (2)
<i>Equilibrium (7)</i>	MAGE (3)	Next Generation Sequencing (2)
Signal Transduction (6)	Gene Expression (3)	<i>NMR (2)</i>
Cancer Sample Prep for Mass Spec (6)	Molecular Cloning (3)	Gene Expression Unit (2)
Confocal Microscopy (5)	Monogenic disorders (3)	Gene Regulation (2)
Antibodies (5)	Plant Transcriptomics (3)	Pluripotent Stem Cell Culture (2)
Exercise Physiology (5)	Mammalian Transient Protein Expression (3)	Regeneration Biology (2)
	<i>Kjeldahl Method (3)</i>	Tissue Engineering (2)
	Synthetic Biology (3)	Viral Gene Therapy (2)

Practice Problems:

Suggested textbook homework problems are posted. These problems will not be collected or graded. It is, however, strongly recommended that you do these problems in preparation for the exams. Practice exams are also posted. Finally an online flash card tool called Ankiweb has been developed as a study tool. Please find the online flash card deck, install the phone ap, and do the problems a little bit each day.

Grades:

Midterm 1

55 points

11%

Midterm 2	55 points	11%
Midterm 3	55 points	11%
Midterm 4	55 points	11%
In-Class Assessments	30 points	6%
Class Participation	30 points	6%
Online Quizzes	55 points	11%
Virtual Lab Exercises	45 points	9%
Final Exam	100 points	20%
Study Buddy Points	20 points	4%
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.