

Biochemistry I, Chemistry 141 Fall 2010

<i>Instructor:</i>	Korin Wheeler, Ph.D.	<i>Meeting time/place:</i>	MWF, 10:30-11:35am Kennedy 108
<i>Office:</i>	DS 107		
<i>Phone:</i>	554 - 4310	<i>Textbook:</i>	
<i>Email:</i>	kwheeler@scu.edu		<u>Lehninger, Principles of Biochemistry</u> by Nelson & Cox, Fifth Edition.
<i>Office Hours:</i>	Wed. 11:35am-1pm Th. 9:00-10:30 am	<i>Additional resources on Angel:</i>	
	Other times available by appointment.		http://angel.scu.edu/default.asp

Course Content:

As the first in a two quarter series, this course will cover essential, introductory topics in biochemistry. The course can be divided into two parts: Following a review of intermolecular forces in the biological context, we will focus on the structure and function of biomolecules, including proteins, DNA, carbohydrates, lipids and enzyme energetics. In the second portion of the course, we will introduce bio-energetics and apply it to understanding metabolic pathways, specifically focusing on two nearly universal pathways: glycolysis and the citric acid cycle.

Review your organic functional groups and general chemistry (acid/base, thermodynamics, kinetics, intermolecular forces, etc.), as it will be assumed that all students have a firm grasp of topics covered in prerequisite courses.

Academic Honesty: You are expected to perform all work associated with any of the graded assignments for this course on your own. Unauthorized consultation in any form is strictly prohibited and may result in failure of this course. The use of computers, cell phones and other electronic communication devices in-class is specifically prohibited. For more information on academic integrity, please refer to: www.scu.edu/academics/bullitins/undergraduate/Academic-Integrity.cfm.

Disability Accommodation Policy: To request academic accommodations for a disability, students must contact Disability Resources (The Drahmann Center in Benson, Room 216. Phone: 554-4111) and provide documentation of a disability to Disability Resources prior to receiving accommodations. For more information, please refer to: www.scu.edu/advising/learning/disabilities/index.cfm

Cell phone policy: Texting and ringing cell phones in class will not be tolerated. Five points will be subtracted from your total grade for each lecture in which this is a problem. If your phone (or any other electronic device other than a calculator) is found on your person during an examination it will be confiscated and considered a breach of academic honesty (see above).

Basic Learning Objectives for Biochemistry I (Chemistry 141):

1. Review the structure and reactivity of amino acids, describing how they serve as building block units of proteins. Illustrate the levels of structural complexity in proteins with emphasis on the impact of Van der Waals forces on protein function & folding.
2. Describe how allosteric interactions may result in significant alterations in protein function for proteins such as hemoglobin.
3. Describe the importance of enzymes as catalysts in biological reactions and describe how the concentration and activity of an enzyme, as well as key kinetic parameters such as K_m and k_{cat} , may be determined in the laboratory.
4. Describe methods that may be used to investigate the mechanism of action of an enzyme with an emphasis on the use of reversible and irreversible inhibitors and generation of genetic mutants in such investigations.
5. Describe the mechanism of action of several well-described enzymes with an emphasis on the role of specific active-site amino acids and/or cofactors.
6. Describe the importance of bioenergetics in biological reactions including the use of activated carriers and coupled reactions to drive otherwise unfavorable reactions.
7. Review the structure and reactivity of simple carbohydrates. Outline the process of glucose breakdown via glycolysis, pyruvate dehydrogenase, and the Krebs' cycle with an emphasis on regulation and interconnectedness of these pathways. Introduce the structures and roles of vitamin-derived cofactors involved in these pathways.
8. Review the structure and reactivity of fatty acids and describe the amphipathic nature of fatty acids, phospholipids, and cholesterol. Describe the asymmetric organization of lipids, proteins, and glycoproteins/ glycolipids in a biological membrane (the fluid mosaic model) and describe various lab techniques used to investigate membrane organization.

Evaluation:

Grades will be assigned based upon performance on 2 midterm exams, 6 weekly quizzes, 4 homework assignments, and a final. The tentative dates for each are given and will be fixed in the schedule with at least one week notice. Make-up exams/quizzes will not be available; if you miss an exam, the weighting of the final exam will increase accordingly. The lowest quiz score will be dropped in the calculation of your final grade. Letter grades will be assigned based on the total distribution of points.

Point Distribution:

homeworks	4 x 25 pts = 100 pts
weekly quizzes	6 x 10 pts = 60 pts
midterms	2 x 125 pts = 250 pts
final	225 pts
TOTAL	625 pts

Re-grade policy: Re-grades will be accepted within one week of the day an assignment is returned. Concerns must be submitted in writing. Upon submission, the entire exam will be re-graded, not just one question.

Tentative Course Schedule: Every effort will be made to maintain the course schedule, however there is no guarantee that all material will be discussed or that all dates are certain. If a topic proves more difficult than expected, we may spend more time than originally allotted. If that happens, the content of the exams will be adjusted accordingly.

Tentative Course Schedule (v1)

DATE	DAY	LECTURE TOPIC	LEHNINGER READING	ASSIGNMENTS DUE
9.20	mon	Introduction		
9.22	wed	Water, bonds & buffers	CH 2	
9.24	fri	Water, bonds & buffers	CH 2	(quiz 1)
9.27	mon	Amino Acids	CH 3.1-2	
9.29	wed	Protein structure – 1D	CH 3.4	
10.1	fri	Protein structure – 3D	CH 4	(quiz 2)
10.4	mon	Protein Purification	CH 3.3	
10.6	wed	Protein Function	CH 5	HW 1
10.8	fri	Protein Function	CH 5	(quiz 3)
10.11	mon	Wrap-up, review.		
10.13	wed	enzyme intro		
10.15	fri	EXAM 1		
10.18	mon	enzyme mechanisms	CH 6	
10.20	wed	enzyme kinetics	CH 6	HW 2
10.22	fri	Enzyme inhibitors		(quiz 4)
10.25	mon	Lipids	Ch 10	
10.27	wed	Lipids	CH 10	
10.29	fri	Membranes	CH 11	(quiz 5)
11.1	mon	Membranes	CH 11	
11.3	wed	Carbohydrates	CH 7	HW 3
11.5	fri	Carbohydrates	CH 7	(quiz 6)
11.8	mon	Intro to metabolism		
11.10	wed	EXAM 2		
11.12	fri	Glycolysis	CH 14	
11.14	mon	Glycolysis	CH 14	
11.17	wed	TCA cycle	CH 16	
11.19	fri	TCA cycle	CH 16	(quiz 7)
11.29	mon	Nucleic acids, DNA	CH 8.1-8.2	
12.1	wed	DNA	CH 9.1-9.4	HW 4
12.3	fri	Special Topic		
	TBA	FINAL EXAM	see e-campus	for time & date.

Learning Tools:

- Lecture: You are required to attend all classes during the quarter. *It is in your best interest to participate in class.* Some topics may be covered in lecture and not covered in the reading, or visa-versa. It will be your responsibility to learn this material as it will be included in the exams and quizzes.
- Readings: The textbook will provide critical background information and reinforce concepts from lecture. I have indicated appropriate chapters for each lecture and will post supplemental readings on ANGEL. Reading the textbook is essential to understanding the lecture material. It is in your best interest to read the suggested text before and again after class. The book often provides a broader scope of topics than covered in class. Learning how to use a textbook is a vital skill. If you continue on in biochemistry, this text will become an essential resource.
- ANGEL: You should consult the course ANGEL webpage regularly throughout the quarter. I will post my lecture slides posted as pdfs approximately a week prior to lecture. I strongly suggest printing the slides and writing directly on them during lecture. I will also post additional readings, other important course materials and handouts. Although postings will be announced, it is your responsibility to download and/or print these postings for yourself.
- Quizzes: On each Friday of a non-exam week there will be a 10min quiz covering the week's topics. Since much of biochemistry relies upon cumulative knowledge, these quizzes are meant to ensure that you are keeping up with the course material and provide me with instant feedback on comprehension of the material. There will be no make-up quizzes (no exceptions).
- Exams: Exams will cover topics discussed in lectures and in the readings. The exams will be a combination of multiple choice, short answer and essay questions. To ensure an accurate assessment of knowledge, you may leave the classroom only after you have turned in your exam. The final will be divided in two halves to allow for a bathroom/stretch break.
- Homework (HW): Homeworks will be due in class on the due date. Two sections of the assignment will be graded for accuracy (20 pts). The rest will be graded based upon completeness and effort (5pts). For late assignments, fifteen percent of the assignment's value will be subtracted for every 24 hours of tardiness.