

GENERAL BIOCHEMISTRY (CHEMISTRY 161)
SPRING, 2009

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Text: Biochemistry: The Molecular Basis of Life by McKee and McKee, 4/e. Oxford publishing. ISBN: 978-0-530575-3. There is a companion study guide that is recommended. Your text also has on-line student resources, including chapter quizzes you can use for exam preparation. Student resources are located at: www.oup.com/us/mckee.

COURSE GOALS

Biochemistry is a fascinating and fundamental area of study. Due to the huge volume of material, a one-semester course in Biochemistry presents a big challenge in learning. It is necessary to both learn a large amount of new material and be able to apply the information in problem-solving situations. We will attempt to streamline the flow of information by focusing on common patterns and themes in Biochemistry. We will apply the new information in two ways, by working chapter problems and by relating it to various aspects of cardiovascular disease. By the end of the semester, I hope you will have gained the following:

- A basic knowledge and appreciation of the properties of the four classes of macromolecules
- A thorough understanding of how basic principles of bonding and energy apply to biological molecules
- A good knowledge of metabolism, particularly in regard to patterns found in multiple metabolic pathways
- An understanding of how Biochemistry impacts all facets of life on earth, including your own!

COURSE REQUIREMENTS

Hour exams. There will be three hour exams. The format will generally be a mixture of short problems and true/false or multiple choice (note: it's a common misperception that multiple choice questions are easy; depending on how they are written, they can actually be very difficult).

One-minute quizzes. This is a very valuable tool that I have used with good success in other lecture courses. At the beginning of each lecture, I will put up an overhead with a simple question or two pertaining to that day's lecture. You will have one minute to answer the question(s), using a Blue Book that I will collect at the end of the quiz. The Blue Books will be

returned for the following lecture's quiz. Students in previous courses have found these quizzes to be instrumental in helping them keep up with the material. Quizzes will be assigned a grade of 2 (you got it right), a 1 (you mostly got it right), or a 0 (you pretty much didn't get it).

Cardiovascular Disease Problems. We will explore the application of much of the material from lecture through periodic short problem sets involving cardiovascular disease.

Final Exam. There will be a cumulative final exam at the end of the semester. The exam will focus more on common patterns than on specific details. The final exam is **Friday, May 22 at 8:00 am.**

HOW TO STUDY

We will be covering a large amount of material in this class, as well as learning how to apply it. It is critical that you not only keep up with the material but that you really understand what it all means. I suggest the following study habits:

- **Spend a minimum of nine hours a week studying for this class.** The general rule of thumb for all chemistry courses is three hours of study outside of class for every one hour in class. And this is the MINIMUM amount of time you should expect to spend.
- **Review your lecture notes often.** At least three times a week. This takes a lot less time than you think and makes a huge difference in retention and understanding.
- **Work problems until you drop.** Work ALL of the chapter problems as we go along and then do them again before the exams. I also HIGHLY RECOMMEND the study guide.
- **Clear up all points of confusion or misunderstanding.** If there is ANYTHING that happens in this course that isn't clear to you, please come to my office hours to clear it up. Biochemistry is NOT that hard (honestly!). I firmly believe anyone can understand this material and do well in the course but it requires some effort.

COURSE ETIQUETTE

My overall philosophy is that I like students to participate in lecture as much as possible, and I will frequently ask you to respond to my questions during lecture as well as encourage all of your questions and comments. Class-based discussion is great. However, certain things need to happen for the class to run smoothly and for everyone's learning to be maximized.

- **Be on time.** I will allow one or two occurrences of tardiness. Beyond that, you will not be permitted to come to class.
- **Refrain from private conversations.** Disruptive talking will not be allowed.
- **Do not text, email, or surf during class.** You can do that on your own time, please.
- **Do not cheat.** Cheating of any kind will not be tolerated. In addition to a substantial grade reduction, any instance of cheating will immediately be reported to the Office of Student Affairs. The campus policies on academic honesty are located at:
<http://www.csus.edu/umannual/student/UMA00150.htm>

Additionally, I reserve the right to remove any student from class whose behavior is disrespectful or inappropriate to me or to the other students in the class.

GRADING (1000 pts)

3 hour exams, 200 points each	600
Final exam	150
CVD problems	150
1 minute quizzes	<u>100</u>
Total	1000

TENTATIVE COURSE SCHEDULE

<u>Date</u>	<u>Topic</u>	<u>Chapter</u>	<u>Problems</u>
1/26	Introduction, macromolecules	1	4-7,9,10,15,16,20,21,43
1/28	Review: organic chemistry, cells	2	2,3,6,11,12,32,35
1/30	Origins of life	---	
2/2	Water: physical properties	3	1-5,8,10,12-14,19,22,24,33,43-45,48,50,53-55
2/4	Water: ionization		
2/6	Energy	4	1,3,6,7,11-13,16,17,26,29,39
2/9	Amino acids	5	2-6,8,10,24,26,30,32,42,43,45-47
2/11	Primary and secondary structure		CVD # 1
2/13	Tertiary and quaternary structure		
2/16	Protein folding and disease		
2/18	EXAM 1 - Chapters 1-6		
2/20	Enzymes: kinetics	6	1,2,4-6,8-12,15,16,18,20,30,33,34,36-42,48,50,54,55
2/23	Enzymes: kinetics and catalysis		
2/25	Enzymes: catalysis		CVD # 2
2/27	Enzymes: regulation		
3/2	Carbohydrates: monosaccharides	7	2-5,7,9-14,16,18-21,23,25,29-31,32,34,36-38,41,44,49,50
3/4	Carbohydrates: polysaccharides		
3/6	Carbohydrates: glycoconjugates		
3/9	Nucleic acids: nucleotides and DNA	17	2,3,6,8-10,12-15,18,22,24,27,28,30,33,41,46
3/11	NAs: DNA and RNA structure		
3/13	NAs: Biotechnology and medicine		
3/16	Lipids: storage and structural	11	1,2,6-8,10-14,17,18,20,21,22,24-31,36-39
3/18	Lipids: signaling and lipoproteins		CVD # 3
3/20	EXAM # 2 - Chapters 6,7,11 (lipids),17		

3/23	Membranes: membrane structure		
3/25	Membranes: membrane transport		
3/27	Overview of metabolism		
4/6	CHO metabolism: glycolysis	8	2-4,8-14,17-20,22,24,26-
4/8	CHO metabolism: gluconeogenesis		28,30,31,34,35,37,38
4/10	Glycogen metabolism		
4/13	Control of CHO metabolism		
4/15	TCA cycle	9	6-15,17,18,21,24,27,32,35,36,40
4/17	TCA cycle		
4/20	Electron transport	10	1,2,4,5,10,16,21,22,24,27,37,40
4/22	Oxidative phosphorylation		
4/24	EXAM # 3 - Chapters 8-10,11 (membranes), 12		
4/27	Digestion of fats	12	4,9-12,14,17,27,30,33,40,41,43,45,49-51
4/29	Fatty acid oxidation; ketone bodies		CVD # 4
5/1	Fatty acid synthesis		
5/4	Photosynthesis: Light reactions	13	3,4,8,9,11,19,20,34,35,45
5/6	Photosynthesis: Light reactions		
5/8	Photosynthesis: Calvin cycle		
5/11	Integration of metabolism	16	2,12,15a,b,17,23,26,29,32,33,37,40,42,50
5/13	Integration of metabolism		
5/15	Catch-up		
5/22	CUMULATIVE FINAL EXAM 8:00-10:00 am		