[redacted] **Biochemistry (3 Credits)** **Winter 2013** F

Professor: [redacted]
email:
Phone:
Office:

Office Hours: M 11:45 a.m. – 1 p.m.
or by appointment

Class Time MWF 10:40 - 11:35 a.m,
Room: [redacted]

This course is a one-semester survey of biochemistry. It fulfills requirements for B.A. and B.S. degrees in chemistry and biology. It is expected that all students will have completed [redacted] or [redacted] (or equivalent) and a survey course in biology - all with grades of C- or better.

Text: Nelson and Cox's Lehninger's Principles of Biochemistry, 5th edition, Freeman, 2008. This book is available in 4 different formats: a) traditional hard cover; b) loose leaf; c) ebook for the Barnes&Noble Nook; d) ebook from directly from the publisher. The content is identical in each of the 4 formats, so it is your preference regarding cost and learning style. The 6th Edition was just released in Dec. 2012. We opted not to use it officially because I had not seen the new edition prior to when textbook decisions had to be made. You are responsible for reading the appropriate sections of the text as assigned on the syllabus or in class. It is recommended that you read the material **PRIOR** to the class at which the material is discussed.

Study Guide: A study guide and solution manual that accompanies this text is available from the publisher. It is considered optional and is not required for the course. There are some good practice problems and summaries in it.

Learning Goals: People enroll in [redacted] for a variety of reasons. Historically, many of the [redacted] students are taking it as a requirement for their major or for entrance to medical/veterinary/dental school. My goal is to make the course fun, informative and interactive. At the same time, I want you to learn to think about biological macromolecules, their structure, their reactivity and how they behave in biological systems. By the end of the term, I want each of you to have proficiency with all of the skills below and have mastered at least a few of them:

Some of the specific skills to be developed in [redacted]:

- Move fluidly between chemical, schematic and cartoon representations of biopolymers and use each in their appropriate context to convey information about a system
- Apply principles of thermodynamic and kinetic analysis to the understanding of metabolic processes and biomolecular structure and function
- Use quantitative reasoning to understand polyprotic systems and the importance of pH and the effects of solution conditions (pH, salt, denaturants, etc.) on biological molecules and enzymatic transformations.
- Use chemical logic to describe how macromolecules perform their specific functions
- Apply knowledge of organic chemistry to the function of enzymes and the understanding of metabolic pathways
- Make appropriate use of on-line resources/databases to find information about biological macromolecules, their structure, their function and their evolutionary relationships with one another
- Solve problems related to the flow of metabolites through metabolic pathways and the regulatory relationships between energy production during catabolism and energy consumption during anabolism.
- Understand the chemical basis of biological information transfer and the central dogma.

Grading:

Mid-Term Exams:	(3 x 200 pts)	600
Creative Project		150
In class quizzes		100
Problem Sets	(3 x 25)	75
Class participation (and JITT)		75
Final Exam:	(1 x 200 pts)	200
Drop lowest exam		-200
Total:		1000

The final course grades will be based on 1200 total points. I will attempt to keep the exams at a level such that A/A-'s will be in the range of 85-100%, (B+/B/B-)'s 70-85% and (C+/C/C-)'s 60-70%. I reserve the right to rescale the final grades on a curve if this straight scale proves unsatisfactory.

Problem Sets: Problems will be assigned to assist in your learning of the material for this course. Problem sets will be graded for effort and completion more than accuracy. While I encourage you to work together in small teams, your PS solutions must be your own, written in your own writing. If answers are copied from classmates, that shows low effort. Since it is hard to establish who took answers from whom, all parties with copied answers will be marked down.

Final Project: There will be a creative project due the last week of the term. You will be asked to represent a facet of biochemistry in a creative medium. In past years, students have written original songs, made short videos and multimedia artwork as part of this project. You may work alone or in small teams (typically up to 3 people). You will then be asked to write a short essay accompanying your work to explain or describe any creative license that was taken. You must note where something is factually incorrect or where liberty was taken in order to make the expressive medium work effectively. If you work in teams, there will also be a survey/questionnaire regarding team management and contributions, including a peer assessment of your co-workers' contributions to the final product.

Exams: There will be 3 mid-term exams and a comprehensive final exam. Final exam conflicts should be rectified with the instructor in advance. You will be entitled to drop either the lowest of the midterm exam grades or the final exam. If you are ill, or miss an exam, it will count as your drop. There will be no makeup exams. **Calculators should be brought to every exam. Sharing of calculators will NOT be permitted.** If you come to an exam without a calculator, you will have to do your calculations by hand.

Quizzes: There will be short quizzes every week, usually on Fridays, except for the weeks of exams. Quizzes will range from 10 – 15 points. You may earn a maximum of 100 quiz points over the term. Since there will be more than enough opportunities to get to your maximum, there will be no makeup quizzes. History shows that quiz performance is an excellent indicator of subsequent exam performance. If you are not scoring well on the quizzes, this should be your signal to change your study habits before it affects your exam score.

Academic Integrity: I have very high expectations for your performance and conduct during this course. Academic misconduct will not be accepted in any form. Students found to be engaging in such activity will fail this course and be reported to the Dean of Students. Since quizzes and participation points are based on the use of classroom clickers, abuse of this system (such as entering information on two response systems for an absent classmate) is considered misconduct and will be referred to the Dean of Students.

Web Material: We will use Blackboard to disseminate class information this year. Copies of all class handouts will be available through this website. I will also use this site to post announcement. Finally, many of the AV materials used in class will be linked to the web page. You are **strongly encouraged** to use these resources in your studying of the course material.

Computers and Biochemistry: The field of biochemistry is increasingly relying upon the use of computers for the visualization and analysis of biochemical information. Some basic computer

literacy will be required for this class since the problem set will require you to use information off of the web and to manipulate biological structures and/or biochemical data.

Reserve Reading: I will strive to have all of this information available in electronic format through eReserves or Blackboard. The reserve material will include several short articles on topics related to the class that supplement the material from our textbook.

Honors Option: Students interested in taking [redacted] with an Honors Option should speak with the instructor during the first week of classes. An option is available but must be selected by Friday Jan. 11 as it entails attending Friday afternoon Biochemistry Seminars, the first of which will take place on 1/11.

Tentative Class Schedule for [redacted] (Winter 2012)

Date	Day	Meeting	Topic	Assignment
1/7	M	1	Introduction to Biochemistry – Central Dogma	Ch. 1
1/9	W	2	Bioinformatics and Genome Projects	Ch. 3.5, reserve
1/11	F	3	Properties of Water and Intermolecular Forces	Ch. 2
1/14	M		No Class – MLK Day	
1/16	W	4	Amino Acids and Peptides	Ch. 3
1/18	F	5	Protein Purification and Analysis	Ch. 3
1/21	M	6	Protein Structure 1	Ch. 4
1/23	W	7	Protein Structure 2	Ch. 4
1/25	F	8	Protein Function	Ch. 5 PS1 DUE
1/28	M	9	Enzyme Kinetics 1	Ch. 6
1/30	W	10	Enzyme Kinetics 2	Ch. 6
2/1	F	11	**FIRST MID-TERM EXAM (Ch. 1-5)**	
2/4	M	12	Enzyme Mechanisms 1	Ch. 6
2/6	W	13	Enzyme Mechanisms 2	Ch. 6
2/8	F	14	Carbohydrates	Ch. 7
2/11	M	15	Glycoconjugates	Ch. 7
2/12	W	16	Nucleotides	Ch. 8
2/15	F	17	Recombinant DNA Technology	Ch. 9
2/18	M	18	Lipids and Membranes 1	Ch. 10
2/20	W	19	Lipids and Membranes 2	Ch. 11
2/22	F	20	Transport Across Membranes	Ch. 11
2/25	M	21	Signaling Across Membranes	Ch. 12
2/27	W	22	Introduction to Metabolism	Ch. 13 PS2 DUE
3/1	F	23	Bioenergetics	Ch. 13
3/4	M	24	Glycolysis 1	Ch. 14
3/6	W	25	Glycolysis 2	Ch. 14
3/8	F	26	**SECOND MID-TERM EXAM (Ch. 6 -12)**	Ch. 14
3/11			SPRING BREAK	
3/13			SPRING BREAK	
3/15			SPRING BREAK	
3/18	M	27	Glucose Metabolism	Ch. 15
3/20	W	28	Citric Acid Cycle 1	Ch. 16
3/22	F	29	Citric Acid Cycle 2	Ch. 16
3/25	M	30	Fatty Acid Metabolism	Ch. 17
3/27	W	31	Fatty Acid Metabolism 2	Ch. 17 PS3 DUE
3/29	F	32	Oxidative Phosphorylation 1	Ch. 19
4/1	M	33	DNA Structure	Ch. 24
4/3	W	34	DNA Replication and Repair 1	Ch. 25
4/5	F	35	DNA Replication and Repair 2	Ch. 25
4/8	M	36	**THIRD MID-TERM EXAM (13-19)**	Ch. 26
4/10	W	37	RNA Structure	
4/12	F	38	Transcription 1	Ch. 26
4/15	M	39	Transcription 2	Ch. 26 Projects Due
4/17	W	40	RNA Processing	Ch. 26
4/19	F	41	Protein Synthesis 1 (guest lecture)	Ch. 27
4/22	M	42	Protein Synthesis 2	Ch. 27
			FINAL EXAM TUESDAY 4/30 (8 – 10:30 a.m.)	