Chemistry 4375/5375: Biochemistry Spring 2015

Monday, Wednesday, Friday 8:00 - 8:50 am, CENT GO1

Instructor:

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Course Description: This course will provide Chemistry majors and minors with an overview of biochemistry topics. Topics include a description of the structure and function of proteins, enzymes, nucleic acids, lipids, and carbohydrates. This course is stacked with CHEM 5375: Biochemistry, a graduate course dedicated to the study of the chemistry of carbohydrates, lipids, proteins, enzymes, and nucleic acids. A study of enzyme kinetics and thermodynamics of coupled reactions is included. Students enrolled in CHEM 5375 will be expected to complete additional work commensurate with a graduate-level class on both exams and assignments.

Prerequisite: CHEM 2342 (Organic Chemistry II) with a grade of C or better. If you do not have the prerequisite, you must drop this course. Failure to drop promptly will result in an administrative drop, and you may not receive a full refund for tuition and fees.

Course Format: This course will use a variety of different formats to address various learning styles. Students are expected to be active participants in their learning by reading the assigned material, intellectually engaging the material presented, and participating in classroom activities.

Course Objectives: After completion of this course, the student should be able to:

- Demonstrate a working vocabulary of biochemical terms (*i.e.*, give a definition and correctly use terms in context)
- Name, identify, and describe the function of the major biological macromolecules and their constituent building blocks
- Use chemical principles to predict and explain the behavior of biomolecules and biochemical systems
- Describe, propose, and justify the use of modern biochemical methods to address current questions in the field of biochemistry systems.
- Employ appropriate data analysis tools to perform bioinformatics analysis of genomes, specific genes, and gene products

<u>Textbook</u>: The required textbook for the class is <u>Fundamentals of Biochemistry</u>, 4^{th} Edition, by Voet, Voet, and Pratt (Wiley, 2014). While previous editions are widely available at lower cost, students are strongly encouraged to use either the 3^{rd} or 4^{th} editions for study and reference.

Course Grades and Assessment

The course will include a variety of assignments and exams. Only whole points may be earned. The point distribution for assessments is as follows:

Exams	4 @ 75 each = 300
Project components	4 @ 15 each = 60
Project poster	15
In-class Clicker quest	ions 75
Final exam	100
	Total: 550

The total points needed for each letter grade are:

A = 492-550 pts	D = 327-381 pts
B = 437-491 pts	$F \leq 327 \text{ pts}$
C = 382-436 pts	

The instructor reserves the right to adjust grading depending on student performance. Any changes to the above policy will be announced in class and on TRACS.

<u>Clicker quizzes</u>: Each lecture session will incorporate Clicker questions for grade credit. Students should be prepared to answer Clicker questions beginning on the fourth class day of the semester. Responses to the questions will be recorded for participation and/or correctness. Over the duration of the semester, Clicker responses will contribute 75 points to the overall course grade. Use of another student's registered Clicker response device is strictly prohibited.

<u>Semester project</u>: Each student will execute a semester-long bioinformatics project that will be constitute 75 points of the overall course grade. This project will be introduced during the second week of the semester. Immediately following each exam, a 15-point component of this project will be assigned and due by the next class period as an electronic submission to TRACS (4 assignments x 15 points = 60 points). The project will culminate in a poster presentation (15 points) to your peers during a poster session the last full week of the semester.

<u>Exams</u>: Exams will contain a combination of multiple-choice and free response questions, and will be based on material from lectures, textbook reading, and suggested problems. While all exams are effectively cumulative because each topic depends on the previous material, Exams 1 – 4 (75 points each) will emphasize the information discussed since the previous exam. The final exam will be fully cumulative (100 points).

Exams will begin 5 minutes after the scheduled class start time (8:05 am) and end at the scheduled class end time (8:50 am). No student will be allowed additional time without documented need by the Office of Disability Services.

At the end of the semester, each student will be given the opportunity to elect whether to replace her/his lowest semester exam score with the scaled final exam score.

If you feel that a question was graded incorrectly, you may petition for a grade correction **no sooner than 48 hours and no later than 2 weeks** after the graded exams are released. The petition must be a clear, written explanation of why you should receive additional points *and* evidence for the correct answer. At that time, the entire exam may be re-graded, causing gain or loss of points on questions not being contested.

In the event of an emergency during an exam, leave your exams with the instructor. If safety permits, remain within the vicinity of the classroom and return when allowed. The instructor will assess whether there is sufficient time to complete the exam.

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Extra credit: There will be bonus points built into each exam (*i.e.*, 77 possible points/75 graded points). No individualized extra assignments will be given.

<u>Attendance Policy</u>: *You are expected to attend every class.* Attendance is important to fully understand the material. There will be material covered in class that is not in your reading and which will be on Clicker quiz questions and exams.

<u>Exams</u>: Make-up exams will not be given. If a student arrives late to class, they will have the remainder of the class period to complete the exam. If a student misses an exam, the final exam grade may be scaled and substituted for the missed exam at the discretion of the instructor. Any second missed exam will be given a zero.

<u>Clickers:</u> In-class Clicker responses will be used for assessment, to both record class participation through attendance and assess student understanding of key concepts as described above. The use of another student's registered Clicker device to submit answers is an Honor Code violation.

TRACS: A TRACS site will be used extensively during this course for posting study resources, assignments, and posting grades. Please refer to it frequently. You must have a valid Texas State University NetID and password.

Questions for instructor: You may email questions to the instructor. If the email is relevant to the entire class, the instructor's response will be posted on TRACS in the "Spring 2015 e-mail responses" folder in a manner that anonymizes the original query.

<u>Academic Integrity:</u> The University Honor Code "require[s] all members of this community to be conscientious, respectful, and honest":

http://www.txstate.edu/effective/upps/upps-07-10-01-att1.html

More broadly, the practice of science is founded upon principles of honesty, trust, accountability, and respect. Without such a foundation, the entire enterprise would crumble. Therefore, the Honor Code is strictly enforced in this course. All assignments are to be completed individually, unless you are explicitly instructed to work in groups. There will be academic consequences for any and all violations. The nature and severity of those consequences are at the instructor's discretion, up to and including failure in the course.

As a reminder of the critical role of academic integrity, you are expected to include the students' pledge and your signature on all written assignments:

"I pledge to uphold the principles of honesty and responsibility at our university."

Drop Policy: Students may drop this course and receive a "W" at anytime prior to the official university deadline on Thursday, March 26^{th} at 5:00 pm. Students may withdraw from the university (*i.e.*, drop all courses) by Thursday, April 23^{rd} , by 5:00 pm.

Special Needs Information: Students with special needs as documented by the Office of Disability Services should identify themselves at the beginning of the semester in order for accommodation to be made.

COURSE OUTLINE:

Class #	Date	Торіс	Assignment due	Corresponding reading*	
1	21-Jan	Syllabus, Chemistry of Life		ch. 1, 2	
2	23-Jan	Chemistry of Life		ch. 1, 2	
3	26-Jan	Carbohydrates		ch. 8	
4	28-Jan	Carbohydrates		ch. 8	
5	30-Jan	Nucleic Acids		ch. 3	
6	2-Feb	Nucleic Acids		ch. 3	
7	4-Feb	Nucleic Acids		ch. 3	
8	6-Feb	Nucleic Acids		ch. 3	
9	9-Feb	Nucleic Acid Bioinformatics		on TRACS	
10	11-Feb	EXAM 1			
11	13-Feb	Amino Acids	Project Part 1	ch. 4	
12	16-Feb	Amino Acids		ch. 4	
13	18-Feb	Protein Structure		ch. 5	
14	20-Feb	Protein Structure		ch. 6	
15	23-Feb	Protein Bioinformatics		on TRACS	
16	25-Feb	Protein Function		ch. 7	
17	27-Feb	Protein Function		ch. 7	
18	2-Mar	Protein Function		ch. 7	
19	4-Mar	EXAM 2			
20	6-Mar	Enzyme Catalysis	Project Part 2	ch. 11	
21	9-Mar	Enzyme Catalysis		ch. 11	
22	11-Mar	Enzyme Kinetics		ch. 12, parts 1-3	
23	13-Mar	Enzyme Kinetics		ch. 12, parts 1-3	
		16-Mar – 20-Mar	no class – spring	g break	
24	23-Mar	Enzyme Kinetics		ch. 12, parts 1-3	
25	25-Mar	Enzyme Kinetics		ch. 12, parts 1-3	
26	27-Mar	Biochemical methods		on TRACS	
27	30-Mar	EXAM 3			
28	1-Apr	Lipids	Project Part 3	ch. 9	
29	3-Apr	Lipids		ch. 9	
30	6-Apr	Biological Membranes		ch. 9	
31	8-Apr	Biological Membranes		ch. 9	
32	10-Apr	Biological Membranes		ch. 10	
33	13-Apr	Membrane Transport		ch. 10	
34	15-Apr	Membrane Transport		ch. 10	
35	17-Apr	Computer Lab: Bioinformatics			
36	20-Apr	EXAM 4			
37	22-Apr	Biochemistry of Disease	Project Part 4	ch. 12, part 4	
38	24-Apr	Biochemistry of Disease			
39	27-Apr	Poster Presentations			
40	29-Apr	Poster Presentations			
41	1-May	Poster Presentations			
42	4-May	Review			
	13-Mav	8 am: COMPREHENSIVE FINAL EXAM			

* Additional reading may be assigned. Note that the above topics, schedule, and exam content are subject to change as needed. Students will be notified *in class* of any changes.