

Biological Chemistry, Chemistry C483
Department of Chemistry, Indiana University, Bloomington, IN
Fall 2009, 3 Credits
MWF, 10:10 am, Chemistry 122

Instructor:

Jill Paterson, PhD
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Chemistry A608

Office Hours:

Wednesday 9:05-10:05 am
Friday 9:05-10:05 am

Associate Instructors:

Required Text:

Principles of Biochemistry, 4th Edition, Horton et al., Pearson Prentice Hall Publishing, 2006.

There is an electronic version of this book available from the bookstore.

Course Website:

The website for this course is:
<http://courses.chem.indiana.edu/c483/>

You will find the following information on the site:

Class notes:

Sets of *incomplete* notes including figures discussed in class will be available on the class website, prior to the corresponding lecture. With the exception of the first class meeting, you are responsible for printing these notes, and bringing them with you to class. Be prepared with the notes; if we end Lecture 2 early, I will begin Lecture 3 a day early. Have the notes ready. **You will be responsible for all material covered in lecture, even if it is not included in the online notes;** you must attend lecture in order to get additional information. These notes are not a substitute for lecture attendance.

Quiz announcements:

Information you must learn for each of the three quizzes will be announced and discussed in lecture, and will also be posted on the website.

Answer keys:

Answers to all quizzes, problem sets, and exams (with the possible exception of the final exam) will be posted on the web site, generally a few hours after each assignment ends.

Question forum:

All relevant questions emailed directly to me will be placed on the website's question forum. You can see what questions your classmates are asking and what the correct answer is. This will serve as virtual office hours.

Prerequisites:

In order to get the most from this course, you should have completed either:

C341 and C342 (Organic Chem I & II)

Or

R340 (Survey of Organic Chemistry)

If you have not fulfilled this requirement, see Dr. Paterson ASAP.

Course Grades:

Your final grade will be based on a total of 725 points, comprised of:

3 problem sets at 50 pts each	150
3 quizzes at 25 pts each	75
3 exams at 100 pts each	300
1 final exam	<u>200</u>
	725

There will be no dropped exams, quizzes, or problem sets. You are responsible for attending each exam and quiz, and for turning problem sets in on time.

A student will be allowed to reschedule quizzes only if s/he has an interview scheduled for professional school, graduate school, or future employment on the date of a quiz. In this case, documentation must be presented prior to the quiz that will be missed. Once approved, these students will be allowed to take a makeup quiz in class on December 9th. Details of the makeup quiz will be given directly to each student.

If, due to illness, you miss an exam or quiz, you must get proper documentation from your health care provider. This documentation must come from a health care worker who personally examined you and must state that "due to your illness there was no possibility of attendance" at the exam or quiz. Please also provide a phone number of the health care worker for confirmation. If your missed exam is excused, you will not be allowed to make up the missed exam, instead your grade will be computed based on fewer points. Everyone must take the final exam in order to complete the class.

Grades will be posted using the CALM system of the Chemistry department. This system can be accessed directly from the course website: <http://courses.chem.indiana.edu/c483/>

Exams:

There will be 4 exams. Three exams (Sept 29, Oct 27, and Dec 1) will cover specified portions of the course and are worth 100 points each. These exams are given on Tuesday evenings, from 7:15-9:15 PM, Location TBA. The final exam (Friday, Dec 18, 12:30-2:30) will be cumulative, covering the entire semester course and is worth 200 points. You must take the final exam to complete the course.

Quizzes:

Three quizzes will be given (9/14, 10/21, 11/11) during lecture. The exact information covered on each quiz will be posted on the course website least 1 week prior to the quiz.

Problem sets:

Three problem sets will be due throughout the semester (9/21, 10/14, 11/20). The problem set is due on its due date, in lecture, at 10:10 am. Problem sets turned in after this time, but before 5 PM of the due date will have 15 pts deducted. Answers will be posted on the course website at 5 PM of the due date. Thus no problem sets will be accepted after 5 PM. While you may discuss these problem sets with others, **you must turn in your own assignment, and it must be in your own words.** Students who turn in identical problem sets will be scored a 0 for the entire assignment.

Regrades:

ONLY exams, quizzes, and problem sets completed in ink will be eligible for a regrade. If you feel we have made an error grading your quizzes, exams, or problem sets, please first check the answer keys posted online. If you still feel an error has been made, bring it to the attention of Dr. Paterson ASAP.

Academic Misconduct:

Do not cheat. If you cheat on an assignment, quiz, or exam, you will receive a grade of 0 and maximum disciplinary action taken as detailed at www.dsa.indiana.edu/code/index1.html.

Discussion Sections:

Discussion sections will begin Wednesday, September 9th. To ensure that all students have access to the same number of discussion sessions prior to each exam, a discussion week will run Wednesday-Tuesday. Everyone is registered for a specific section, but you are welcome to attend any of the four discussion sections. Attendance will be taken in the discussion sections, but attendance is not mandatory. Each week, the discussion session will have a specific set of information to be covered, will allow time for any questions you have, and will provide you with additional problems to work. Topics and problems discussed are listed on the following page.

Meeting times:

Monday	4:40-5:30	SW220	Section 9787
Tuesday	4:40-5:30	BH144	Section 9788
Wednesday	4:40-5:30	PY111	Section 9789
Thursday	4:40-5:30	ED0101	Section 9790

Lecture:

The last page of this syllabus contains a list of lecture topics for the semester. The lecture schedule will be fluid, with one lecture flowing into the next; if we finish lecture 2 early, we will jump into lecture 3, or if lecture 2 runs long, we will carry it on to the next lecture.

Discussion schedule:

Week	Dates	Subjects	Assignment before arriving	In discussion
1	8/31-9/8	No discussions		
2	9/9-9/15	Buffer Problems Ionization states	Chapter 2: 7,8,9,10,14,15 Chapter 3: 8,9,10,12,14,16	Discussion of assigned problems. If time is available, new problems will be presented
3	9/16-9/22	Protein purification Protein structure	Chapter 4: 1,2,3,4,8,12,13,15,16	Discussion of assigned problems. If time is available, new problems will be presented
4	9/23-9/29	2008 C483 exam 1 & problem sets (2008 & 2009)	Work through 2008 exam and problems sets	Open for questions on all topics relevant to exam #1
5	9/30-10/6	Discussion of Exam #1		Will work through exam
6	10/7-10/13	Enzyme kinetics	Chapter 5: 2,3,4,5,6,7,9,11,12,14,15	Discussion of assigned problems. If time is available, new problems will be presented
7	10/14-10/20	Enzyme mechanisms Carbohydrates	Chapter 6: 1,3,4,6,7c,8,9,10,13 Chapter 8: 1,2,4,5,7,11,13,15,	Discussion of assigned problems. If time is available, new problems will be presented
8	10/21-10/27	Lipids 2008 C483 exam 2 and problem sets (2008 & 2009)	Chapter 9: 1,3,4,5,6,7,11,12 Work through 2008 exam and both problem sets	Open for questions on all topics relevant to exam #2.
9	10/28-11/3	Coenzymes Energetic metabolites	Chapter 7: 1,2,3,4,5,8,9,10 Chapter 10: 1,2,4,5,6,7,10,11,13,14,16	Discussion of exam #2, discussion of assigned problems. If time is available, new problems will be presented
10	11/4-11/10	Glycolysis TCA	Chapter 11: 1,2,5,6,8,10,11,13 Chapter 13: 1,3,4,6,8,9,10,13,14,	Discussion of assigned problems. If time is available, new problems will be presented
11	11/11-11/17	Electron transport chain Gluconeogenesis and Pentose phosphate pathway	Chapter 14: 2,4,5a,7,8,10,11b Chapter 12: 2,4,5,6,9,10,12,14	Discussion of assigned problems. If time is available, new problems will be presented
12	11/18-11/24	β -oxidation 2008 C483 exam 3 & problem sets (2008 & 2009)	Chapter 16: 3,5,6 Work through 2008 exam and problems sets	Open for questions on all topics relevant to exam #3
13	11/25-12/1	NO DISCUSSIONS; Thanksgiving break		
14	12/2-12/8	Protein metabolism Preparation for final exam	Chapter 17: no assigned problems	Open for question on all material covered Fall 2009 in C483

Lecture Schedule:

Class	Day	Date	Subject	Corresponding Readings	Assignments
1	M	8/31	Intro to biochemistry ATP	1.1-1.3, 19.1, 10.6-10.7	
2	W	9/2	Cellular compartmentalization; Biochemical thermodynamic equations	1.4-1.10	
3	F	9/4	Biomolecular interactions	2.1-2.6	
4	M	9/7	Amino acids	3.1-3.3	
5	W	9/9	Acid/Base, pH, pKa, Buffers	2.7-2.10	
6	F	9/11	Ionization of amino acids	3.4	
7	M	9/14	Primary structure of proteins	3.5; 3.8	Quiz #1 (Amino acids)
8	W	9/16	Protein purification	3.6-3.7; 3.9-3.11	
9	F	9/18	Proteomics		
10	M	9/21	3D- structure of proteins	4.1-4.8	Problem Set #1 due
11	W	9/23	Enzyme active sites		
12	F	9/25	Protein folding	4.9-4.10	
13	M	9/28	In-class review for exam 1		
	T	9/29	Exam #1, 7:15-9:15 PM		Covers Lectures 1-13 & corresponding readings
14	W	9/30	Collagen, antibodies, and globins	4.11-4.14	
15	F	10/2	Enzyme classification	5.1, Handout	
16	M	10/5	Nonallosteric enzyme kinetics	5.2-5.6	
17	W	10/7	Inhibition and regulation of nonallosteric enzymes	5.7-5.8	
18	F	10/9	Allosteric enzyme kinetics	5.9-5.11	
19	M	10/12	Enzyme mechanisms	6.1-6.7	
20	W	10/14	Monosaccharides & Polysaccharides	8.1-8.6	Problem set #2 due
21	F	10/16	Glycoproteins	8.7	
22	M	10/19	Lipids	9.1-9.7	
23	W	10/21	Biological membranes	9.8-9.10	Quiz#2 (carbohydrates)
24	F	10/23	Transport across biological membranes Signal transduction	9.11-9.12	
25	M	10/26	Review for Exam #2		
	T	10/27	Exam #2, 7:15-9:15 PM		Covers Lectures 14-25 & corresponding readings
26	W	10/28	Coenzymes and vitamins	7.1-7.16	
27	F	10/30	Introduction to metabolism	10.1-10.4	
28	M	11/2	High energy metabolites	10.4-10.10	
29	W	11/4	Glycolysis	11.1-11.6	
30	F	11/6	Glycolysis continued		
31	M	11/9	The citric acid cycle	13.1-13.6	
32	W	11/11	The citric acid cycle continued		Quiz #3 (glycolysis)
33	F	11/13	Electron transport chain	14.1-14.12	
34	M	11/16	Electron transport chain continued		
35	W	11/18	Pentose phosphate pathway	12.4-12.7	
36	F	11/20	Gluconeogenesis	12.1-12.3	Problem set #3 due
37	M	11/23	Lipid metabolism/ β -oxidation	16.1, 16.7-16.11	
	W	11/25	No class, Thanksgiving break		
	F	11/27	No class, Thanksgiving break		
38	M	11/30	Review for Exam #3		
	T	12/1	Exam #3, 7:15-9:15 PM		Covers Lectures 26-38& corresponding readings
39	W	12/2	Protein metabolism Overall summary of metabolism	17.1-17.2, 17.6-17.8, Handout	
40	F	12/4	Your metabolism: exercise & starvation	Handout	
41	M	12/7	Cancer	Handout	
42	W	12/9	Stem Cells	Handout	
43	F	12/11	Review for Final Exam		
	F	12/18	FINAL EXAM, 12:30-2:30		Covers Lectures 1-42 & corresponding readings

