

C383: Biological Chemistry
Spring 2017

Dr. Ben Burlingham
Office: Chemistry A206
Phone: 856-7782
Email: bburling@indiana.edu

Lecture:
1:25 PM, MWF
Discussion:
M, W, or R

Class Website: <http://courses.chem.indiana.edu/c383/default.asp>
Grades will be posted on Canvas

Instructor Office Hours: M noon-1PM, T 9-10AM, R 1:30-2:30PM
Students are also welcome to attend my C483 office hours (T 1:30-2:30PM, W 2:30-3:30PM, F 9-10AM) and ask questions when there are no C483 students.

Class Organization:

In this three-credit course, there will be classroom lecture daily and discussion sections on Monday through Thursday. Attendance is required in both lecture and discussion.

Associate Instructor:

Fidel Huerta fhuerta@umail.iu.edu
Goran Tumbic gtumbic@umail.iu.edu

Office Hours:

M 5:30-6:30PM, T 4-5PM
W 3:30-4:30PM, R 4:30-5:30PM

Course Description: Introduction to macromolecular structure, enzyme catalysis, the role of biological membranes, and central metabolism

Learning Objectives. At the completion of the course, students will be able to:

- Explain how the chemical structures of proteins, polysaccharides, lipids, and nucleic acids dictate their function in biological systems
- Solve qualitative and quantitative problems concerning solution pH, reaction thermodynamics, enzyme kinetics, membrane potential
- Use chemical principles to describe the metabolic processes of energy acquisition, storage, and utilization
- Describe metabolic regulatory processes, including those mediated by signal transduction
- Recognize the chemical motifs of redox reactions, hydrolysis, and decarboxylation in metabolic chemistry
- Introduction to fundamental biochemical experimental techniques

Text Materials:

Required: Biochemistry: A Short Course, 3e, by Tymoczko, Berg, and Stryer. You might choose to get the book, the loose leaf, or an electronic option.

Grading:

Discussion exercises:	100 pts
Exams:	300pts
Metabolism Quiz	50 pts
Final Exam:	<u>150pts</u>
Total	600 pts

Anticipated grading scale: A = above 90%, B = 80-89.9%, C = 65-79.9%, D = 50-64.9%, F=below 50%. Plus/minus grades will be awarded.

Homework: Working out problems is necessary to be successful in biochemistry. The problems will not be directly graded, but you should keep up with them from day to day. Many exam questions will be similar or the same as homework questions. There are two types of homework.

Reading guides are questions that help you focus on the fundamentals in the chapter reading. If you can answer all these questions, you have a good baseline knowledge of biochemistry. Reading guides are available on the course website.

Problems come from two sources. Book Problems come from the end of the textbook chapter. These help you to apply your knowledge of biochemistry. Discussion Worksheet Problems are accessible on the course website. They cover/review general and organic chemistry concepts necessary for success in the course.

Discussion Exercises: During discussion section, you will be reviewing/learning one fundamental concept in biochemistry that is needed to understand lecture material. These concepts are often the ones that give students the most trouble, yet are essential for a strong understanding of the course. During discussion, your AI will guide you through a 10-point exercise covering those skills. These problems are based on the Book and Discussion Worksheet problems. You may drop 2 of the 12 discussion exercises for a total discussion grade out of 100 points. There are no make-up discussion exercises; any missed exercise can be counted as a drop. The discussion schedule is on the website.

Exams: Many exam questions will be based on or identical to the Reading Guides, Book Problems, and Discussion Worksheets. Three midterm exams, each worth 100 points, will be given from **7:15-9:15PM on February 9, March 9, and April 20 in a room TBA**. A 50-point Metabolism Quiz will be given **during class on April 3**. Because biochemistry is a subject that builds upon previously learned material, all exams will be cumulative in a sense, but will focus on the material covered since the previous exam. No makeup exams will be given; if a valid excuse is given for missing an exam, the percentage grade on the final will be substituted for the missed exam grade. Please talk to the instructor at least a week ahead of the exam if there is a known conflict with one of the exams.

Final Exam: The final exam will be cumulative and worth two midterm exams. The final will be given from **5-7PM, Wednesday, May 3 in a room TBA**.

Academic Honesty:

The determination of academic misconduct is at the discretion of the instructor. The sanctions may range from deduction of points to a failing grade for the class. In all cases, the infraction will be immediately reported to the Dean of Students as well as the dean or director of the student's school. Please read the *Code of Student Rights, Responsibilities, and Conduct* for further detail.

Withdraw: See the College's Policy on withdrawing from class at:
<http://college.indiana.edu/ado/policies.shtml>

My suggested plan for approaching C383: You should maximize the results you get for the amount of effort you put in. You can use the same amount of time in different ways and be more or less effective. If you avoid procrastination, you will do much better in the class!!! Here is how I would do it if I were you.

1. **Before class**, at minimum, I would read the summary of the section to be covered in class, becoming familiar with the key concepts and terminology. Ideally, I would read the section and answer many of the Reading Guide questions. If I ran into something I didn't understand right away, I would note it.
2. **During class**, because I have already become familiar with the topics and types of questions, I would take notes, writing more details on the types of questions I had problems with.
3. **AS SOON AS POSSIBLE after class** (while things are still fresh), I would finish the Book problems and review the Reading guide.
4. **Then start again for the next class!**

Tips for maximum success:

- **You need to attend all classes and discussions.**
- Practice, practice, practice. Solve all assigned homework (and maybe work on some that are not assigned!)
- Develop and use your own study aids, such as flashcards and study guides.
- Be persistent in asking questions. Take advantage of discussion sections. Come to office hours as soon as you are having problems.
- Form study groups.
- Don't get behind! One day behind puts you two days behind; you won't understand the next class because you missed the previous.

I want to see you succeed! My personal goal is to see every individual student succeed to the level he or she is willing to work. Please feel free to talk with me any time you want—keep me up to date with how you are doing.

Tentative Class Schedule: The class schedule, with assigned homework problems, is given on the following page. You may access electronic copies of the lectures on the course website site. It may be changed by the instructor to better meet the needs of the class.

Date	Chapter	Book Problems
Jan 9	Ch 1	Ch 1: 7, 11, 12
Jan 11	Ch 2	Ch 2: 12, 15, 18-20
Jan 13	Ch 2	
Jan 18	Ch 33	Ch 33: 4, 7, 8, 14, 20*, 22, 25
Jan 20	Ch 33	*wrong answer given in book
Jan 23	Ch 3	Ch. 3: 1, 3, 6, 12, 15-19
Jan 25	Ch 4	Ch 4: 4, 15, 20, 24, 27
Jan 27	Ch 5	Ch 5: 3, 6, 9, 19, 21, 22
Jan 30	Ch 6	
Feb 1	Ch 6	Ch 6: 6-10, 14, 17-20, 22-23
Feb 3	Ch 7	Ch 7: 3, 4, 6, 7, 10, 12
Feb 6	Ch 7	Ch 7: 15, 16, 20, 21, 23, 24
Feb 8	Review Exam 1	Chapters 1-7
Feb 10	Ch 8	Ch 8: 3, 8-11, 17
Feb 13	Ch 8	Ch 8: 5-7, 14
Feb 15	Ch 9	Ch 9: 13, 16, 17, 18, 22
Feb 17	Ch 10	Ch 10: 2, 16, 17, 21
Feb 20	Ch 11	Ch 11: 2, 4, 5, 12
Feb 22	Ch 12	Ch 12: 2, 3, 7, 10, 19, 20, 23, 24, 25
Feb 24	Ch 13	Ch 13: 8, 11, 13, 23, 26, 27
Feb 27	Ch 14	Ch 14: 1, 2, 4, 5, 8, 10
Mar 1	Ch 15	Ch 15: 9, 10, 12, 15, 27, 32
Mar 3	Ch 15	Ch 15: 18-20, 22, 24
Mar 6	Ch 16	Ch 16: 2, 4, 7-9, 15, 16, 20
Mar 8	Review Exam 2	Chapters 8-15
Mar 10	Ch 16	Ch 16: 5, 12, 13, 33, 35
Mar 20	Ch 17	Ch 17: 2, 3, 7, 13, 16, 17, 19, 25
Mar 22	Ch 18	Ch 18: 1, 5, 7, 10, 15, 19
Mar 24	Ch 19	Ch 19: 1, 5, 8, 10, 12, 14, 16, 27
Mar 27	Ch 19	Ch 19: 15, 17, 18, 25
Mar 29	Ch 20	Ch 20: 1-4, 6, 8, 9, 12, 15, 17
Mar 31	Ch 21	Ch 21: 3, 5, 13, 19, 23, 26
Apr 3	Metabolism quiz	Chapters 16-19
Apr 5	Ch 24	Ch 24: 6, 7, 13, 23, 24, 28
Apr 7	Ch 25	Ch 25: 4, 5, 7, 12
Apr 10	Ch 26	Ch 26: 1, 2, 6, 9, 11, 12
Apr 12	Ch 27	Ch 27: 3, 8, 12, 15, 25, 28, 29, 33
Apr 14	Ch 28	Ch 28: 1, 6, 7, 15, 18, 19, 21, 28
Apr 17	Ch 29	Ch 29: 12, 14, 16, 17, 25, 27, 28
Apr 19	Review Exam 3	Chapters 16-21, 24-26
Apr 21	Ch 30	Ch 30: 4, 5, 9, 12
Apr 24	Ch 30	Ch 30: 15, 16, 21, 25, 28
Apr 26	Ch 31	Ch 31: 7, 9-12, 14, 17, 21
Apr 28	Review	

Tentative Discussion Schedule: The discussion schedule, with Discussion Worksheet problems, is posted on the course website. It may be changed by the instructor to better meet the needs of the class. Notice that Discussion Sections 2-4 run from Tuesday to the following Monday due to MLK Jr. Day, then resumes Monday-Thursday.

Dates	Topic
M Jan 9-R Jan 12	1. Review of Acid-Base Chemistry: Part 1
T Jan 17-M Jan 23	2. Review of Acid-Base Chemistry: Part 2
T Jan 24-M Jan 30	3. Functional groups and hydrolysis
T Jan 31-M Feb 6	4. Six classes of enzyme catalyzed reactions
T Feb 7-R Feb 9	Exam 1 Review
M Feb 13-R Feb 16	5. Graphic analysis-kinetics and binding
M Feb 20-R Feb 23	6. Carbohydrate chemistry
M Feb 27- R Mar 2	7. Thermodynamics of biological reactions: qualitative
M Mar 6-R Mar 9	Exam 2 Review
M Mar 20- R Mar 23	8. Thermodynamics of biological reactions: quantitative
M Mar 27 - R Mar 30	9. Arrow mechanisms: aldol reactions, decarboxylation
M Apr 3- R Apr 6	10. Reduction potential
M Apr 10 - R Apr 13	Exam 3 Review
M Apr 17 - R Apr 20	11. Motifs in metabolic chemistry
M Apr 24 - R Apr 27	12. Cofactors and summary of metabolic reactions