

9-2014

BCH 380.03: Fundamentals of Biochemistry

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BCH 380--Fundamentals of Biochemistry--Fall 2014

Instructor:	Dr. Stephen Lodmell (stephen.lodmell@umontana.edu)
Rooms/times:	All students: MWF 10:10-11am HS207 Sec. 3 discussion: Tues. 11:10-12 LA338 Sec. 5 discussion: Tues. 10:10-11 SB114
Office hours:	MWF 11-12 (CHCB202) and by appointment.
Teaching assistant:	Dustin Becht (office hours and locations TBA in discussion sections)
Text:	Biochemistry: A Short Course by Tymoczko, Berg and Stryer, 2 nd ed.
Open discussion:	One hour optional discussion, time & place TBA

Expected Outcomes

This course aims to provide a fundamental knowledge of biochemistry, including

- understand the chemical and thermodynamic properties of biomolecules
- know the main classes of biomolecules, including structure, synthesis and function
- understand the catalytic and regulatory strategies of enzymes
- understand the production, use and regulation of energy in the cell
- understand how signal pathways regulate networks of chemical reactions
- understand how biomolecular building blocks and chemical reaction networks are integrated into systems to form a functional cellular metabolism

Prerequisites: Biochemistry is one of the disciplines of chemistry, so students should have a good working knowledge of general chemistry and organic chemistry. The logic of biochemistry is clearest if you understand the underlying chemical principles. It is a good idea to review basic chemical concepts and organic reactions on your own early in the course. A solid foundation in Cellular and Molecular Biology (e.g. BIOB260) is also required and is extremely helpful for putting much of what we study in Biochemistry in the context of living cells.

Course Requirements

Students are expected to attend all lectures and discussion sections. Students are expected to study the text carefully, and are strongly encouraged to read the relevant text or assigned reading material prior to the corresponding lectures. Questions or problems sets will be assigned for each chapter.

Students are encouraged to participate in class discussions as well as to meet outside of class in study groups. Refer to the course Moodle page for other course resources.

Lecture and discussion format

The Monday, Wednesday, and Friday lectures will cover material from the text and additional readings that will be posted on Moodle. Additionally, each student is required to attend his/her Tuesday small-group discussion section. Material covered in the discussion periods will typically be of clinical/medical, or physiological relevance and students are responsible for this material on subsequent quizzes and exams. The discussion sessions will also serve as a time to ask questions and to clarify course material and to administer weekly quizzes on weeks without exams.

Grading

There will be weekly quizzes or equivalent assignments given in discussion sessions. In addition there will be four exams, consisting of three one hour exams (given on Tuesdays) and one comprehensive final exam. The lowest score out of the three midterm exams will be dropped, but the final exam score cannot be dropped. The course grade is determined from the exams and quiz scores as follows:

2 highest out of 3 midterm exams:	50%
8 highest out of 10 weekly quizzes:	25%
Final exam:	25%

Final grades will be assigned as follows: 90-100% = A, 80-89% = B; 70-79% = C; 60-69% = D; below 60% = F. Plusses and minuses will be used for grades at the extremes of the letter grade range as follows: A, A-, B+, B, B-, C+, C, C-, D+, D, D-, F.

Missed Quizzes and Exams

The two lowest quiz grades will be dropped (including any missed quizzes), but makeup quizzes will not be given. Students will have the option of dropping the lowest of the three midterm exam scores and should use this flexibility to cover a missed exam. Exceptions will only be made for unusual circumstances and in accordance with the general absence policies and procedures, as described in the UM course catalog.

Notes and Moodle

Class notes will be posted on Moodle. Remember that these notes are what we use as an *outline* for class preparation. They are not intended to be used as a substitute for coming to class or for doing the readings.

General Policies

General University Policies

University policies on drops, adds, changes of grade option, or change to audit status will be strictly enforced in this course. These policies are described in the current UM catalog. Briefly:

Dropping Classes

Through the 15th instructional day, **ALL** classes are dropped in CyberBear.

From the 16th through the 45th instructional day, all classes must be dropped using Drop forms (instructor signature required, advisor signature required for undergraduates). **\$10 fee applies.**

From the 46th to the last instructional day prior to finals week, classes must be dropped using the Drop form (instructor and Dean signatures required, advisor signature required for undergraduates). **\$10 fee applies.**

Changing Grade Option

Through the 15th instructional day, all grade options are changed in CyberBear.

Changes to/from Audit **MUST** be completed by the 15th instructional day.

From the 16th instructional day to the last instructional day prior to finals week, all grade options must be changed using an Add/change form (instructor signature required, advisor signature required for undergraduates).

Variable Credit Change

Through the 15th instructional day, variable credits are changed in CyberBear.

From the 16th instructional day to the last instructional day prior to finals week, variable credits must be changed using an Add/change form (instructor signature required, advisor signature required for undergraduates).

Section Changes (changing section for SAME class only)

Through the 7th instructional day, section changes can be added one of three ways:

1. Directly in CyberBear
2. Registration override forms (instructor signature required)
3. Electronic overrides

From the 8th instructional day to the last instructional day prior to finals week, all section changes must be added using an Add/change form (instructor signature required, advisor signature required for undergraduates). **\$10 fee applies.**

Academic honesty

In working through homework and writing assignments, students are encouraged to work together to solve problems, to share information or resources, and to test each other's understanding of the material. Those are all acceptable forms of collaboration. However, the written work that each student turns in must be his or her own. Only in this way can faculty judge individual understanding of concepts or information. A good rule of thumb for students to follow is to work together up to the point of committing words to paper. At that stage, each student must work independently. A second key guideline is that once a student has written an out-of-class assignment, it must not be shown to another student in the course. Assignments from two or more students that have significant overlap, in the professional judgment of the faculty member, will be regarded as reflecting a violation of the expectation that students turn in independent assignments. Please note that direct copying of sentences from any published without proper citation is considered plagiarism. **THIS INCLUDES THE INTERNET.** Be sure to put the information in your own words and be aware that the instructor will check literary and Internet resources. Violations will be dealt with according to the Student Conduct Code.

All exams and quizzes are 'closed book', that is, you may not use any notes in print, audio, or electronic form. Please turn off cell phones, calculators, MP3 players and all other electronic devices prior to the start of exams and quizzes.

Special accommodations: The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommasson 154. I will work with you and DSS to provide an appropriate accommodation.

Tentative lecture topics schedule

NOTE: This schedule is based on the 2nd edition of the text; chapter numbers are different in the 1st edition.

M 8/25 Course introduction, Chapter 1

W 8/27 Chapter 2- Water, pH, buffers

F 8/29 Chapter 2- Water, pH, buffers

Discussion Sections: Tu 8/26 Review of organic chemistry.

M 9/1 Labor Day holiday – no class

W 9/3 Chapter 3- amino acids

F 9/5 Chapter 4- protein structure

Discussion Sections: Tu 9/2: the bicarbonate buffer system and Quiz 1

M 9/8 Chapter 4- protein structure/folding & *Read chapter 5 on your own*

W 9/10 Chapter 6- Enzyme properties

F 9/12 Chapter 7- Enzyme kinetics

Discussion Sections: Tu 9/9: Hair protein structure and trichothiodystrophy and Quiz 2

M 9/15 Chapter 7- Enzyme kinetics, Chapter 7 – Enzyme Mechanisms and Inhibitors

W 9/17 Chapter 8 – Enzyme Mechanisms and Inhibitors

F 9/19 Chapter 9- Hemoglobin

Discussion Sections: Tu 9/16: Proteases Inhibitors as Drugs and Quiz 3

M 9/22 Chapter 10 – Carbohydrates/polysaccharides

W 9/24 **Exam 1 Chapters 1-9**

F 9/26 Chapter 11 – Lipids

DISCUSSION SECTIONS: Help session for exam

M 9/29 Chapter 12 – Membranes

W 10/1 Chapter 12 – Membrane Function

F 10/3 Chapter 13 – Signal Transduction

Discussion Sections: Tu 9/30: Salmonella Lipid A Structure and Quiz 4

M 10/6 Chapter 13 – Signal Transduction

W 10/8 Chapter 15 – Thermodynamics of Metabolism, ATP, and Vitamins

Read chapter 14 on your own

F 10/10 Chapter 15-16 – Metabolism Overview and Glycolysis

Discussion Sections: Tu 10/7: Imatinib: an inhibitor of Tyrosine Kinase and Quiz 5

M 10/13 Chapter 16 – Glycolysis

W 10/15 Chapter 16 – Glycolysis and Chapter 17 – Gluconeogenesis

F 10/17 Glycogen Metabolism (selections from Chapters 24 - 25) and Chapter 26 – Pentose Phosphate Pathway

Discussion Sections: Tu 10/14: Fermentation – merry microbes and Quiz 6

M 10/20 Chapter 26 – Pentose Phosphate Pathway

W 10/22 **Exam 2 Chapters 10 – 17**

F 10/24 Chapters 18 and 19 – Citric Acid Cycle

DISCUSSION SECTIONS: Study/ question/ answer session for exam

M 10/27 Chapter 20 – Electron Transport Chain
W 10/29 Chapter 20 – Electron Transport Chain
F 10/31 Chapter 21 – Oxidative Phosphorylation and The Proton-Motive Force
Discussion Sections: Tu 10/28: Metal Toxicity and Citrate and Quiz 7

M 11/3 Chapter 27 – Fatty Acid Oxidation
Tu 11/4 Election Day, no classes
W 11/5 Take quiz 8 today to accommodate holiday and Chapter 27 – Fatty Acid Synthesis
F 11/7 Chapter 27 – Fatty Acid Synthesis and Quiz 8
Discussion Sections: Tu 11/09 (no class- Election day)

M 11/10 Ch 27- Fatty Acids
Tues 11/11 *Veteran's Day – No Class Veterans Day*
W 11/12 Regulation of Metabolism: Carbs and Fats
F 11/14 Chapter 33 – Nucleotides and Nucleic Acids and Quiz 9
Discussion Sections: No class: Veterans Day

M 11/17 Chapter 34- DNA Replication
W 11/19 Chapter 35- DNA Repair and Recombination
F 11/21 Chapter 36 – Transcription in Prokaryotes
Discussion Sections: Quiz 10

M 11/24 ***Exam 3 Chapters 18 – 33 (All students HS207 at normal class time)***
W 11/26 Thanksgiving break- no class
F 11/28 Thanksgiving break- no class

M 12/1 Chapter 37 – Transcription in Eukaryotes
W 12/3 Chapters 38 – 39 Translation
F 12/5 Chapters 38 – 39 Translation
Discussion Sections: Tu 12/2: Review for final

FINAL EXAM: 75% Comprehensive 25% Chapters 33 – 39
8:10 -10:00 am 12/11/2014 in HS 207