BCH 380--Fundamentals of Biochemistry--Fall 2018

Instructor:	Dr. Stephen Lodmell (stephen.lodmell@umontana.edu)
Rooms/times:	All students: MWF 10:00-10:50 F301
	Sec. 3 discussion: Tues. 11:00-11:50 LA338
	Sec. 5 discussion: Tues. 10:00-10:50 CHCB452
Office hours:	MWF 11-12 (CHCB202) and by appointment.
Teaching assistant:	Mr. Vikash Kumar vikash.kumar@umontana.edu
	(office hours Thursdays 11-1pm SB472, or arrange)
Required Text:	Biochemistry: A Short Course by Tymoczko, Berg and Stryer, 2nd or 3rd ed.
Open discussion:	One hour optional discussion, 5:00pm (day to be arranged) in CHCB230

Expected Outcomes

Upon successful completion of this course, students will have gained a solid understanding of the fundamental concepts, components and pathways of biochemistry. In particular, students will:

- 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 *before* 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 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 (https://www.umt.edu/registrar/PDF/201870-Official-Dates-and-Deadlines.pdf)

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.**

Important dates for Fall 2018:

Autumn Semester 2018

Date	Description
Wednesday-Friday, August 22-24	New Student Orientation
Monday, August 27	Autumn Semester Classes Begin
Monday, September 3	Labor Day – No Classes, Offices Closed
Tuesday, November 6	Election Day – No Classes, Offices Closed
Monday, November 12	Veterans Day Observed – No Classes, Offices Closed
Wednesday, November 21	Student Travel Day – No Classes
Thursday-Friday, November 22-23	Thanksgiving Break – No Classes, Offices Closed
Friday, December 7	Last Day of Regular Classes
Monday-Friday, December 10-14	Final Exams

Academic honesty

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code: (http://www.umt.edu/vpesa/documents/Student%20Conduct%20Code%20PDF-%20FINAL%208-27-13.pdf)

All exams and quizzes are 'closed book', that is, you may not use any notes in print, audio, or electronic form. Please turn off and put away all cell phones, calculators, MP3 players and 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. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

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 8/27 Course introduction, Chapter 1
W 8/29 Chapter 2- Water, pH, buffers
F 8/31 Chapter 2- Water, pH, buffers
Discussion Sections: Review of organic chemistry.

M 9/3 Labor Day holiday – no class
W 9/5 Chapter 3- amino acids
F 9/7 Chapter 4- protein structure
Discussion Sections: The bicarbonate buffer system and Quiz 1

M 9/10 Chapter 4- protein structure/folding & *Read chapter 5 on your own*
W 9/12 Chapter 6- Enzyme properties
F 9/14 Chapter 7- Enzyme kinetics
Discussion Sections: Hair protein structure and trichothiodystrophy and Quiz 2

M 9/17 Chapter 7- Enzyme kinetics, Chapter 7 – Enzyme Mechanisms and Inhibitors
W 9/19 Chapter 8 – Enzyme Mechanisms and Inhibitors
F 9/21 Chapter 9- Hemoglobin
Discussion Sections: Proteases Inhibitors as Drugs and Quiz 3

M 9/24 Chapter 10 – Carbohydrates/polysaccharides
W 9/26 Chapter 11 – Lipids
F 9/28 ***Exam 1 Chapters 1-10***
DISCUSSION SECTIONS: Help session for exam

M 10/1 Chapter 12 – Membranes
W 10/3 Chapter 12 – Membrane Function
F 10/5 Chapter 13 – Signal Transduction
Discussion Sections: Salmonella Lipid A Structure and Quiz 4

M 10/8 Chapter 13 – Signal Transduction
W 10/10 Chapter 15 – Thermodynamics of Metabolism, ATP, and Vitamins
Read chapter 14 on your own
F 10/12 Chapter 15-16 – Metabolism Overview and Glycolysis
Discussion Sections: Imatinib: an inhibitor of Tyrosine Kinase and Quiz 5

M 10/15 Chapter 16 – Glycolysis
W 10/17 Chapter 16 – Glycolysis and Chapter 17 – Gluconeogenesis
F 10/19 Glycogen Metabolism (from Ch. 24 - 25) and Ch. 26 – Pentose Phosphate Pathway
Discussion Sections: Fermentation – merry microbes and Quiz 6

M 10/22 Chapter 26 – Pentose Phosphate Pathway
W 10/24 ***Exam 2 Chapters 11 – 17***
F 10/26 Chapters 18 and 19 – Citric Acid Cycle
DISCUSSION SECTIONS: Study/ question/ answer session for exam

M 10/29 Chapter 20 – Electron Transport Chain
W 10/30 Chapter 20 – Electron Transport Chain
F 11/2 Chapter 21 – Oxidative Phosphorylation and The Proton-Motive Force
Discussion Sections: Metal Toxicity and Citrate and Quiz 7

M 11/5 Chapter 27 – Fatty Acid Oxidation
T 11/6 **Election Day- No classes, no discussion sections**
W 11/7 Take quiz 8 today to accommodate holiday and Chapter 27 – Fatty Acid Synthesis
F 11/9 Ch 27- Fatty Acids
Discussion Sections: Tu 11/06 (no class- Election day)

M 11/12 **Veterans Day- no classes**
W 11/14 Regulation of Metabolism: Carbs and Fats
F 11/16 Chapter 33 – Nucleotides and Nucleic Acids
Discussion Sections: Quiz 9

M 11/19 Chapter 34- DNA Replication
W 11/21 Thanksgiving break- no class
F 11/23 Thanksgiving break- no class
Discussion Sections: Quiz 10

M 11/26 Chapter 35- DNA Repair and Recombination
W 11/28 ***Exam 3 Chapters 18 – 34***
F 11/30 Chapter 36 – Transcription in Prokaryotes

M 12/3 Chapter 37 – Transcription in Eukaryotes
W 12/5 Chapters 38 – 39 Translation
F 12/7 review for final
Discussion Sections: Review for final

F 12/7 Last day of class, review for final

FINAL EXAM: 75% Comprehensive 25% Chapters 33 – 39
8:00 -10:00 am Thursday 12/13/2018 in F305