BCH 380.00: Biochemistry

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BCH 380--Fundamentals of Biochemistry--Spring 2024

Instructor Information.
Instructor: Prof. Kent Sugden, Kent.Sugden@umontana.edu
Recitation TA: Ifeoluwa Dada, ifeoluwa.dada@umconnect.umt.edu
Office hours: T, Th 10-11 (Chem 116/back office, come through 115) or by appointment
Text: “Biochemistry: A Short Course” by Tymoczko, Berg and Stryer 2nd or 3rd ed

Learning Objectives
- Understanding the chemical and thermodynamic properties of biomolecules
- Knowledge of the 4 classes of biomolecules, including structure, synthesis and function.
- Understanding the catalytic and regulatory strategies of enzymes
- Understanding the production, use and regulation of energy in the cell
- Understanding how biochemical reactions are integrated into cellular metabolism

Prerequisites:
Biochemistry is a sub-discipline of chemistry, so students should have a good working knowledge of biology, general chemistry and organic chemistry. Prerequisites are CHMY 223 or CHMY 123 and BIOB 260. It is a good idea to review basic chemical concepts as well as organic reactions, nomenclature and organic functional groups.

Course Requirements
Students are expected to study the text and should read the text prior to the corresponding lectures. Questions for each chapter are given in Moodle and it is suggested that you review these problems. However, homework will not be collected or graded.

Lecture and discussion format
The Monday, Wednesday, and Friday lectures will cover material from the text. Additionally, each student is required to attend one smaller group discussion section, which is scheduled on Tuesday or Thursday. Material covered in the discussion periods will typically be a deeper understanding of the lecture material. The discussion sessions will also serve as a time to ask questions and to clarify course material and to administer weekly tutorials on weeks without exams. On three Tuesdays during the semester the entire class will meet in lieu of individual discussion periods for midterm exams.

Grading
There are weekly graded tutorials given in discussion sections. In addition, there will be four exams, consisting of three one-hour exams (given on Tuesdays during discussion section time) and one comprehensive final exam. The lowest score of the three midterm exams will be dropped, but the final exam score cannot be dropped. Final grades will be assigned as: 90-100% = A, 80-89% = B; 70-79% = C; 60-69% = D; below 60% = F. Plusses and minuses may be used at the discretion of the instructor. Changes to this grading scheme is at the discretion of the instructor.
Missed tutorials and Exams
The lowest tutorial grade will be dropped, makeup tutorials will not be given. Students will have the lowest of the three midterm exams dropped so there will be no exceptions for a missed exam. **THERE IS NO EXTRA CREDIT.** If you miss a tutorial or exam due illness or family emergency that will count as your dropped tutorial or exam.

General Policies
If you are taking the course for a non-traditional grade (credit/no credit), note that university policy is that a “CR” grade is given in lieu of A through D- grade; an “NCR” grade is given in lieu of an F grade. The use of any external device including electronic devices such as calculators and translators for quizzes and exams requires the advanced approval of the instructor.

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. The Code is available for review online at [http://life.umt.edu/sa/vpsa/index.cfm/page/2585](http://life.umt.edu/sa/vpsa/index.cfm/page/2585)

Special accommodations
If you are registered with ODE and require special accommodations, please contact Prof. Sugden to make arrangements. Tests or quizzes taken at ODE must be the same day and overlap the same time period as that of the rest of the class. There is no online or remote proctored options.
Approximate Lecture Schedule (Chapter #’s based on 2nd edition of book)

WEEK 1 (1/18-1/19)
Syllabus/Class Organization: Chapter 1: Biochemistry and the Unity of Life
No discussion sections in first week.

WEEK 2 (1/22-1/26)
Chapter 2: Water, Weak Bonds and pH
Chapter 3: Amino Acids
Discussion Sections: Organic Chemistry Review

WEEK 3 (1/29-2/2)
Chapter 4: Protein 3D Structure
Chapter 6: Enzymes
Chapter 7: Kinetics and Regulation
Discussion Sections: Acids, Bases and Buffered Systems

WEEK 4 (2/5-2/9)
Chapter 8: Mechanisms and Inhibitors
Chapter 9: Hemoglobin and Allosteric Proteins
Review for Test #1: Chapters 1-9 (note we skipped Chapter 5)
Discussion Sections: Amino Acids and Proteins

WEEK 5 (2/12-2/16)
Tuesday 02/13 Exam 1: Chapters 1-9; in CHEM 212 at 10:00 am
Chapter 10: Carbohydrates
Chapter 11: Lipids
Hand back Test and go over key and grading
No discussion sections meet the week of a test

WEEK 6 (2/19-10/23)
Feb 19 No Class. President's Day
Chapter 12: Membranes
Chapter 13: Signal Transduction
Discussion Section: Carbohydrate Structure

WEEK 7 (2/26-3/1)
Chapter 15: Metabolism: Basic Concepts and Design
Chapter 16: Glycolysis
Chapter 17: Gluconeogenesis
Discussion Sections: Lipids / Membrane Structure

WEEK 8 (3/4-3/8)
Chapter 18: Preparation for CAC
Chapter 19: CAC
Review for test #2
Discussion Sections: Metabolism and Regulation

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WEEK 9 (3/11-3/15)

**Tuesday 3/12 Exam 2: Chapters 10 – 19; in CHEM 212 at 10:00 am**

- Chapter 20: Electron Transport Chain
- Chapter 21: The Proton-Motive Force
- Hand back Test and go over key and grading
- *No discussion sections meet the week of a test*

WEEK 10 (3/18-3/22)

- Spring Break (no classes)

WEEK 11 (3/25-3/29)

- Chapter 24: Glycogen Degradation
- Chapter 25: Glycogen Synthesis
- Chapter 26: Pentose Phosphate Pathway
- *Discussion Sections: Electron Flow and Respiration*

WEEK 12 (4/1-4/5)

- Chapter 27: Fatty Acid Degradation
- Chapter 28: Fatty Acid Synthesis
- Chapter 33: Nucleic Acid Structure
- *Discussion Sections: Glycogen and the Pentose Phosphate Pathway*

WEEK 13 (4/8-4/12)

- Chapter 34: DNA Replication
- Chapter 35: Recombination and Repair
- Chapter 36: RNA Synthesis and Regulation
- *Discussion Sections: Nucleic Acid Structure*

WEEK 14 (4/15-4/19)

- Chapter 37: Gene Expression in Eukaryotes
- Chapter 38: Transcription
- Review for test #3
- *Discussion Section: Transcription/Translation*

WEEK 14 (4/23-4/26)

**Tuesday 4/23 Exam 3: Chapters 20 – 37; in CHEM 212 at 10:00 am**

- Chapter 39: The Genetic Code
- Go over Test #3
- *No discussion sections meet the week of a test*

WEEK 15 (4/29-5/3)

- Chapter 40: Protein Synthesis
- Review for final

WEEK 16 (5/6-5/10)  **FINAL EXAM: ~80% Comprehensive and 20% Chapters 38 – 40**

- Wednesday 5/8; 10:10 am-12:10 pm in Chem 123 lecture room