

# BIOC 380--Fundamentals of Biochemistry--Autumn 2017

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## Instructor Information.

Instructor: Prof. Kent Sugden, Kent.Sugden@umontana.edu  
Office hours: M,W,F 11-12 (Chem 306) or by appointment  
Text: "Biochemistry: A Short Course" by Tymoczko, Berg and Stryer 2<sup>nd</sup> ed

## Course Aims

- 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 general chemistry and organic chemistry. It is a good idea to review basic chemical concepts as well as organic reactions, nomenclature and 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 the text 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 either Tuesday or Thursday. Material covered in the discussion periods will typically be of clinical/medical, or physiological relevance and students may be 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. On three Tuesdays during the semester the entire class will meet in lieu of individual discussion periods for midterm exams.

## Grading

There are weekly quizzes 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. Pluses and minuses may be used at the discretion of the instructor.

**Changes to this grading scheme is at the discretion of the instructor.**

## Missed Quizzes and Exams

The two lowest (or missed) quiz grades will be dropped, makeup quizzes 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.**

## 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>

## Special accommodations

If you are registered with Disability Student Services and require special accommodations, please contact Dr. Sugden to make arrangements. Tests or quizzes taken at DSS must be the same day and overlap the same time period as that of the rest of the class.

## Lecture Schedule (Chapter #'s based on 2<sup>nd</sup> edition of book)

### WEEK 1 (8/28-9/01)

- Introduction: Syllabus and Class Organization  
*No discussion sections in first week.*

### WEEK 2 (9/4-9/8)

- Monday 9/04: Labor Day Holiday
- Chapter 1: Biochemistry and the Unity of Life
- Chapter 2: Water, Weak Bonds and pH  
*Discussion Sections: Organic Chemistry Review*

### WEEK 3 (9/11-9/15)

- Chapter 3: Amino Acids
- Chapter 4: Protein 3D Structure  
*Discussion Sections: The bicarbonate buffer system*

### WEEK 4 (9/18-9/22)

- Chapter 6: Basic Concepts of Enzyme Action
- Chapter 7: Kinetics and Regulation
- Chapter 8: Mechanisms and Inhibitors  
*Discussion Sections: Hair protein structure and trichothiodystrophy*

### **WEEK 5 (9/25-9/29)**

- Chapter 9: Hemoglobin and Allosteric Proteins
- Chapter 10: Carbohydrates
- Review for Test #1: Chapters 1-10 (note we skipped Chapter 5)  
*Discussion Section: Proteases Inhibitors as Drugs*

### **WEEK 6 (10/02-10/06)**

**Tuesday 10/03 Exam 1: Chapters 1-10; in CHCB 452 at 10:00 am**

- Chapter 11: Lipids
- Chapter 12: Membranes
- Handback Test and go over key and grading  
*No discussion sections meet the week of a test*

### **WEEK 7 (10/09-10/13)**

- Chapter 13: Signal Transduction
- Chapter 15: Metabolism: Basic Concepts and Design
- Chapter 16: Glycolysis  
*Discussion Sections: Salmonella Lipid A Structure*

### **WEEK 8 (10/16-10/20)**

- Chapter 17: Gluconeogenesis
- Chapter 18: Preparation for CAC
- Chapter 19: CAC  
*Discussion Sections: Imatinib: an inhibitor of Tyrosine Kinase*

### **WEEK 9 (10/23-10/27)**

- Chapter 19: CAC
- Chapter 20: Electron Transport Chain  
*Discussion Sections: Fermentation – merry microbes*

### **WEEK 10 (10/30-11/03)**

- Chapter 21: The Proton-Motive Force
- Chapter 24: Glycogen Degradation
- Review for Test #2: Chapters 11-20 (note we skipped Chapter 14)  
*Discussion Sections: Metal Toxicity and Citrate*

### **WEEK 11 (11/06-11/10)**

**Tuesday 11/07 Exam 2: Chapters 11 – 20; in CHCB 452 at 10:00 am**

- Chapter 25: Glycogen Synthesis
- Chapter 26: Pentose Phosphate Pathway
- Friday 11/10: Veterans Day Holiday  
*No discussion sections meet the week of a test*

**WEEK 12 (11/13-11/17)**

- Handback Test and go over key and grading
- Chapter 27: Fatty Acid Degradation
- Chapter 28: Fatty Acid Synthesis

Discussion Sections: Diabetes

**WEEK 13 (11/20-11/24)**

- Chapter 33: Nucleic Acid Structure
- Thanksgiving Break

No discussion sections meet this week

**WEEK 14 (11/27-12/01)**

- Chapter 34/35: DNA Replication and Repair
- Chapter 36/37: RNA Synthesis and Regulation
- Review for Test #3: Chapters 21-33

Discussion Sections: Breast Cancer and DNA Repair Enzymes

**WEEK 15 (12/04-12/08)**

**Tuesday 12/05 Exam 3: Chapters 20 – 35; in CHCB 452 at 10:00 am**

- Chapter 38: RNA processing
- Chapter 39/40: Translation
- Handback Test and go over key and grading

No discussion sections meet this week

**WEEK 16 (12/11-12/12)**

- Review for Final
- Semester Ends 12/12 (No discussion sections)

**FINAL EXAM: ~80% Comprehensive and 20% Chapters 36 – 40**

**8:00-10:00 Friday 12/15 in Forestry Room 305**