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BIOC 380.01: Fundamentals of Biochemistry

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BIOC 380--Fundamentals of Biochemistry--Spring 2015

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 2nd 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 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 2nd edition of book)

WEEK 1

| | |
|--------|--------------------------------|
| M 1/26 | Course introduction, Chapter 1 |
| W 1/28 | Chapter 2- Water, pH, buffers |
| F 1/30 | Chapter 2- Water, pH, buffers |

Discussion Sections: Tu 1/27 and Th 1/29 No discussion sections in first week.

No Quiz

WEEK 2

| | |
|-------|------------------------------|
| M 2/2 | Chapter 3- amino acids |
| W 2/4 | Chapter 4- protein structure |
| F 2/6 | Chapter 6- Enzyme properties |

Note that we skip Chapter 5 on Techniques in Protein Biochemistry

Discussion Sections: Tu 2/3 and Th 2/5: Organic Chemistry Review

Quiz 1: Chapters 1 and 2

WEEK 3

| | |
|--------|----------------------------------------------|
| M 2/9 | Chapter 7- Enzyme kinetics |
| W 2/11 | Chapter 8 – Enzyme Mechanisms and Inhibitors |
| F 2/13 | Chapter 9- Hemoglobin |

Discussion Sections: Tu 2/10 and Th 2/12: The bicarbonate buffer system

Quiz 2: Chapters 3 and 4

WEEK 4

| | |
|--------|--------------------------------------------|
| M 2/16 | No class |
| W 2/18 | Chapter 10 – Carbohydrates/polysaccharides |
| F 2/20 | Test Review |

Discussion Sections: Tu 2/17 and Th 2/19: Hair protein structure and trichothiodystrophy

Quiz 3: Chapters 6 and 7**WEEK 5**

| | |
|--------|--------------------------------------------|
| M 2/23 | Chapter 10 – Carbohydrates/polysaccharides |
| W 2/25 | Chapter 11 – Lipids |
| F 2/27 | Chapter 12 – Membranes |

NO DISCUSSION SECTIONS MEET THIS WEEK

Tuesday 2/24 Exam 1: Chapters 1-10; in CHEM 212 at 10:10 am

WEEK 6

| | |
|-------|--------------------------------------------------------------|
| M 3/2 | Chapter 12 – Membrane Function |
| W 3/4 | Chapter 13 – Signal Transduction |
| F 3/6 | Chapter 15 – Thermodynamics of Metabolism, ATP, and Vitamins |

Note that we skip Chapter 14 on digestion!

Discussion Sections: Tu 3/3 and Th 3/5: Proteases Inhibitors as Drugs

Quiz 4: Chapters 10 and 11**WEEK 7**

| | |
|--------|-------------------------------------------------|
| M 3/9 | Chapter 16 – Metabolism Overview and Glycolysis |
| W 3/11 | Chapter 16 – Glycolysis |
| F 3/13 | Chapter 17 – Gluconeogenesis |

Discussion Sections: Tu 3/10 and Th 3/12: Salmonella Lipid A Structure

Quiz 5: Chapters 12 and 13**WEEK 8**

| | |
|--------|----------------------------------|
| M 3/16 | Chapters 18 -- Citric Acid Cycle |
| W 3/18 | Chapters 19 – Citric Acid Cycle |
| F 3/20 | Test Review |

Discussion Sections: Tu 3/17 and Th 3/19: Imatinib: an inhibitor of Tyrosine Kinase

Quiz 6: Chapters 15 and 16**WEEK 9**

| | |
|--------|--------------------------------------------------------------------|
| M 3/23 | Chapter 20 – Electron Transport Chain |
| W 3/25 | Chapter 21 – Oxidative Phosphorylation and The Proton-Motive Force |
| F 3/27 | Chapter 21 – Oxidative Phosphorylation and The Proton-Motive Force |

NO DISCUSSION SECTIONS MEET THIS WEEK

Tuesday 3/24 Exam 2: Chapters 11 – 19; in Chem 212 at 10:10 am

WEEK 10

| | |
|--------|--------------|
| M 3/30 | Spring Break |
| W 4/1 | Spring Break |
| F 4/3 | Spring Break |

NO DISCUSSION SECTIONS MEET THIS WEEK

WEEK 11

| | |
|--------|----------------------------------------|
| M 4/6 | Chapters 24 -- Glycogen Metabolism |
| W 4/8 | Chapter 25-- Glycogen Synthesis |
| F 4/10 | Chapter 26 – Pentose Phosphate Pathway |

Discussion Sections: Tu 4/7 and Th 4/9: Fermentation – merry microbes

Quiz 7: Chapters 18 and 19**WEEK 12**

| | |
|--------|-----------------------------------|
| M 4/13 | Chapter 27 – Fatty Acid Oxidation |
| W 4/15 | Chapter 28– Fatty Acid Synthesis |
| F 4/17 | Test Review |

Discussion Sections: Tu 4/14 and Th 4/16: Metal Toxicity and Citrate

Quiz 8: Chapters 20 and 21**WEEK 13**

| | |
|--------|-------------------------------------------|
| M 4/20 | Chapter 33 – Nucleotides and Nucleic Acid |
| W 4/22 | Chapter 34 – DNA Replication |
| F 4/24 | Chapter 35 – DNA Repair and Recombination |

NO DISCUSSION SECTIONS MEET THIS WEEK

Tuesday 4/21 Exam 3: Chapters 20 – 33; In CHEM 212 at 10:10 am

WEEK 14

| | |
|--------|-------------------------------------------|
| M 4/27 | Chapter 36 – Transcription in Prokaryotes |
| W 4/29 | Chapter 37 – Transcription in Eukaryotes |
| F 5/1 | Chapter 38 – RNA Processing |

Discussion Sections: Tu 4/28 and Th 4/30: Diabetes

Quiz9: Chapters 27 and 28**WEEK 15**

| | |
|-------|-------------------------|
| M 5/4 | Chapters 39 Translation |
| W 5/6 | Chapter 40 Translation |
| F 5/8 | Review |

Discussion Sections: Tu 5/5 and Th 5/7: Breast Cancer and DNA Repair Enzymes

Quiz10: Chapters 34- 36

**FINAL EXAM: 75% Comprehensive 25% Chapters 34 – 40
10:00-12:00 Wednesday 5/13 in HS207**