

## BIOCHEMISTRY I CHEM 4600 Spring 2019

**Instructor:** Dr. Victoria Mariani, 216 Courtland North, Tel. (404) 413-5542, [vmariani@gsu.edu](mailto:vmariani@gsu.edu)

**Prerequisites:** required: Chem 1211K, 1212K, 2400 and 2410 (grade of C or higher in Organic 2 (2410))  
recommended: Biol 3800 (Molecular Cell Biology)

**Lecture:** MWF 12:30 pm – 2:00 pm, CS 608

**Office Hours:** Mondays 2 – 4; Friday 10 – 12:30

### **Textbook:**

Text: You can use 7th or 8th edition of text. I use the 8<sup>th</sup> edition for my reading assignments.

Biochemistry, 8th Ed., Berg, J.M.; Tymoczko, J.L.; Gatto, G.J.; Stryer, L., (2015), W.H. Freeman: New York, NY. [ISBN 1-4641-2610-0 Hardcover or ISBN 1-4641-8801-7 Looseleaf] or

Biochemistry, 7th Ed., Berg, J.M.; Tymoczko, J.L.; Stryer, L., (2012), W.H. Freeman: New York, NY. [ISBN 1-4292-2936-5 Hardcover or ISBN 1-4292-7396-8 Looseleaf]

Workbook: This is strongly recommended. The workbook includes learning objectives, self-assessment problems with solutions, and comprehensive problems. I will go over the questions from the text and workbook (see icollege “suggested problems”) during class. I recommend you use the 8<sup>th</sup> edition of the workbook.

Biochemistry Student Companion, 7th Ed., Deis, F.H.; Gerber, N.C.; Gumport, R.I.; Koeppe, R.E., (2012), W.H. Freeman: New York, NY. [ISBN 1-4292-3115-7 Paperback].

Biochemistry Student Companion, 8th Ed., Rhodes, C.; Fertuck, K.; Josephy, D.; Koeppe, R.E., (2015), W.H. Freeman: New York, NY. [Paperback]

**Tutorial Sessions:** These sessions will be run by past students to review the material. Time: TBA

**Tutorial Center:** The tutorial center is in Sports Arena 125 Decatur St SE, First Floor

There will be a tutor specifically for Biochemistry there to answer your questions. This is a good time to ask questions on specific homework problems and lecture topics. Time: TBA

**iCollege:** BIOCHEMISTRY I XLS GROUP RW SPRING SEMESTER 2019

All announcements will be posted on icollege. Please check it often. All notes from class will be posted within 24 hours after class.

***Please do not email me on icollege.*** Email me at [vmariani@gsu.edu](mailto:vmariani@gsu.edu)

**Exams 4600:** There will be four class exams worth **100** points each. The lowest exam grade will be dropped. If you miss more than one exam, the 2<sup>nd</sup> missed exam will require proper documentation. See: <http://codeofconduct.gsu.edu/files/2013/03/2013-14-Student-Code-IV.F.-Policy-on-Class-Attendance.pdf>

There will be a required comprehensive final exam worth **150** points (on **May 6 10:45 pm** CS 608). The final exam is mandatory, and it will not be dropped under any circumstance. Failure to take the final WILL NOT result in a grade as an incomplete, simply a 0 will be used as the final exam grade.

Test scores will be posted on icollege. If there is a mistake or your score is missing, you must come to my office to discuss. *You are responsible for checking grades!* The icollege website is simply a tool to report grades, it is not my gradebook.

**Quizzes 4600:** Quizzes will collectively be worth **50** points. There will be approximately 10-15 quizzes on icollege and about 10 quizzes in class. Quizzes will be 3 - 5 questions. To earn the maximum quiz grade you need about 80% of the points in each category (in class and icollege). The final quiz score will be approximately 70:30 in class: icollege.

### **Grade Calculation 4600:**

1. Add up 3 highest exam grades, total points earned on quizzes, final exam grade.
2. Divide by 5 for %
3. Use scale to estimate grade

Semester Grade = (sum 3 best class exams + quiz points + final exam) / 5

A+ 97% A 93% A- 89% B+ 85% B 80% B- 76% C+ 68% C 62% C- 58% D 50% F <50%

**Learning Outcomes:** The course will focus on developing an understanding of the biochemical principles and processes that govern the structure, interactions, functions & transformations of biomolecules; this will help students rationalize biochemical facts and solve problems. Upon successful completion of the course students will have the tools to be able to apply their knowledge of biochemistry to understand the causes of human diseases, as well as applications of biochemistry in medicine, agriculture and the environment.

**Course Objectives:** A comprehensive and integrated review of modern biochemistry with emphasis on proteins, enzymes, nucleic acids, lipids, carbohydrates and metabolism. Will examine biomolecular structure-function relationships, concepts of enzyme function, regulation, bioenergetics, metabolism, gene expression, and characterization of biomolecules. Organization, transport and signaling in cells will also be examined. Principles of acid/base chemistry, redox, organic mechanisms, kinetics, and thermodynamics will be applied throughout. *Working knowledge of these topics covered in 1211, 1212, 2100 and 2410 is expected PRIOR to taking biochemistry.*

**Secrets to Success:** Those who are successful in this course: 1) **Review:** Read the text and/or look over power points before lecture. This is to familiarize yourself with the material before it is covered such that one can pick up information in class time. 2) **Reinforce:** Look over and/or recopy the notes from the lecture within a day of the class. This is to reinforce the material and to make you aware of any problem spots. 3) **Apply:** Regularly work problems from the text, companion, sample exams and internet. If you

cannot apply the material it will be difficult to answer multiple choice questions on the exams. 4) If you have questions about the material or problems come to my office hours with questions

**To pass this course you need to do more than simply memorize the material.** You need to be able to “apply” the material. Reading the text or another source is real important for this. To be successful one must learn to “speak the language of biochemistry”.

**Notes:** There will be no incompletes given for this course. Poor course performance is not rewarded with an incomplete. Do not ask. If you have a hardship, the Dean of Students is where you go. Please see: <http://deanofstudents.gsu.edu/student-assistance/emergency-withdrawal/>

*There will be no grade changes in this course.* I simply add up the points you earned. I cannot alter what you earned. Unfortunately, there is no score for “hard work”. If there are any issues with your grade or course work, you must come to my office (not email) before the *last day of class* to discuss. The day grades are due is a terrible time to address these issues!

**Exam Dates (Subject to change)**

<u>no.</u>	<u>Date</u>	
1	Friday	September 14
2	Friday	October 5
3	Friday	November 10
4	Friday	November 30
F	Monday	December 10 at 4:15!

## **Topics for Exam 1:**

1.1 What is Biochemistry

1.3 properties of water, intermolecular interactions, acid/base chemistry, buffers,  $pK_a$

2.1 -2.6 amino acid structures, properties and reactivity,  $pI$  and peptide charge, peptide bonds, 3D protein 2<sup>o</sup>, 3<sup>o</sup> and 4<sup>o</sup> structure, thermodynamics of protein folding (hydrophobic effect)

4.1 -4.3 DNA structure and function

3.1 -3.2 protein purification, separation techniques

5.2 recombinant protein purification

## **Topics for Exam 2:**

7.1- 7.3 hemoglobin structure and oxygen transport, cooperativity and allostery

8.1 - 8.6, 8-ap enzymes, classes of enzymatic reactions, Michaelis-Menten kinetics, enzyme inhibition

9 notes catalytic strategies, carboxypepsidase A mechanism

9.1 chymotrypsin Mechanism

10.1 - 10.4 allosteric enzymes, enzyme regulation

## **Topics for Exam 3:**

11.1- 11.2 carbohydrates structure and reactivity

12.1 types of lipids

15.1- 15.3, reactions of metabolism and energy utilization by ATP/redox

13.1, 13.3 membrane transport

16.1 -16.4 glycolysis reaction, mechanisms, and regulation, fermentation reaction, gluconeogenesis

17.1 – 17.4 transition reaction and regulation, citric acid cycle reactions, mechanisms, and regulation

## **Topics for Exam 4:**

18.1 – 18.6 biochemical oxidation-reduction reactions (redox review), electron transport chain, oxidative phosphorylation, regulation, membrane transport and shuttles

21.1 – 21.5 glycogen breakdown & regulation, glycogen synthesis and regulation

14.1, 14.2 signal transduction: gPCR's and tyrosine phosphorylation cascades

22.1 – 22.2 fatty acid catabolism,

27.3 diabetes

27.5 overview of metabolic processes

### **Note:**

We may progress faster or slower throughout the semester. Topics from a previous section could be held for the next exam or topics from a later session could have been covered and added to the exam.

I only will add topics to the exam that have been covered!

**\*\*Please come to class regularly for exact topics covered on the exam.\*\***