General Biochemistry

PG5-155, Tuesdays and Thursdays 5-6:15 PM

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Office hours: 2-4 PM Thursday

Hello eager, young minds welcome to Biochemistry class. This is an incredibly important, foundational class that requires a significant amount of information and concepts to be learned. If you have any aspirations for biological research or the medical, dental, nursing, or other health related professions, this class will be very important to do well in.

Course Catalog Description: Chemistry of proteins, lipids, carbohydrates, and nucleic acids; principles of enzymology, metabolism and bioenergetics.

Student Learning Objectives: You will know the chemical structures and chemistry of biological polymers (proteins, carbohydrates, lipids and nucleic acids) and their monomers (amino acids, sugars, fatty acids and other lipid monomers, and nucleotides) as well as the roles of these biological molecules in living cells. You will be able to solve amino acid sequences of protein, nucleotide sequences of nucleic acids from experimental data and how to determine structures of carbohydrates and lipids. You will be able analyze enzyme kinetic data as well as the bioenergetics/thermodynamics of biochemical reactions. You will know the reactions of major metabolic pathways: Central Metabolism (Glycolysis-Gluconeogenesis, Pentose phosphate Pathway, Citric Acid Cycle) and Respiratory Electron Transport System, Glyoxylate Cycle; Beta-oxidation of fatty acids and be able to analyze the regulation of these pathways.

Before Class: You will have two main resources for this class, the online lectures and the textbook. We will be using the videos created by Dr. Makemson who taught this course for 20 years. The lectures do not cover everything in each chapter, and you will only be tested on concepts covered in the lectures. However, the lectures may not explain concepts sufficiently for you. There will be a lot of information in the lectures, if you do not understand something he is going over, refer to the textbook. Nearly every figure in the lectures is in the textbook, and further explanation of it can be found in there. Pause the video before he talks and make sure you understand everything on the slide. When you don't understand the slide, refer to the textbook. While watching the lectures, think about the thought problems. After the lectures you can take the Though Problems quizzes on the Canvas website, but these will not be graded. It's a good idea after you watch a lecture to go over this to test your comprehension of the lecture. Alternatively, because each lecture covers nearly everything in the textbook, you can just read the assigned chapter for that class.

Homework: After watching the lecture and going over the Thought Questions, do the homework quiz. This will be in the form of a multiple-choice question sets on Canvas. You can pause take as long as you like to perform these quizzes, but they must be completed before

class time. You will be able to view all the questions at once, and can take the quiz twice to increase your score (highest score kept).

When studying: It is very helpful to write notes. After you have watched a slide, or read a paragraph write a short summary in your own words of what you have just learned, how it relates to other biochemical facts, or draw a diagram. Drawing can be one of the most effective ways of solidifying material in your mind.

Groups: Form study groups and consult each other when performing the homework and understanding the lectures. Groups of 6-8 people will be formed the first day of class by the tables that you sit at, and will be maintained throughout the semester. It is best to pick a group/table and not move during the semester, this way the LA that will cover that area can get to know you better.

During Class: This is a flipped class, meaning that I will not be doing long lectures. Please come to class with pencil and notebook, calculator, textbook, laptop, and having STUDIED the Narrated Power Points and done the Homework Quiz for each class. We will begin the class by discussing the more difficult concepts from the lectures and homework questions and what will be emphasized on quizzes and tests to follow. We will do active learning activities to help understand this information. At the end of class we will take a short quiz that must be performed independently. The quiz will be online, utilizing a lockdown browser.
Following this, we will go over the quiz as a group.

In the classroom, do not spend extended periods of time (>1 minute) discussing sports, other classes, people you don't like, or Netflix shows. Do spend time talking about the assignment that you should work on. Remember what you are here for, remember your goals. There is a reason you're taking this course, perhaps you have a professional aspiration, such as medicine, pharmacy or research science. So do not let yourself be distracted during class time.

Exams: Each exam will focus mostly on the lessons learned from the current section, but will have 3-5 cumulative questions. Exam material will be everything covered in the Makemson lectures and in class exercises. There will be 5 exams (plus the final) throughout the course. Exams may require calculations, and these will be provided on the computer. Exams will be online, utilizing a lockdown browser.

Final exam: This will be cumulative and will be from the ACS Biochemistry Exam (i.e. a national standardized test). We will use this test as an objective measure of your progress in learning Biochemistry.

Foundational Knowledge: Molecular structures of amino acids, nucleotides, some sugars, some lipids, Glycolysis and TCA cycle intermediates. This assumes that you have already mastered: Gibbs free energy, R/S categorization of a molecule, assigning alpha- or beta- to sugars, some common functional groups carboxyl, amino, imidazole, hydroxyl, carbonyl, aldehyde, ketone, acetyl, phosphate, sulfhydryl (thiol), and guanadino. Flashcards are helpful for these things.

There is a lot of important information to assimilate in biochemistry that sets the foundation for many advanced biological courses. You have lots of space in your brain for these facts, just replace all your TV and movie trivia with Biochemistry!

Textbook *Biochemistry* 1st edition, by Meisfeld and McEvoy., Norton Publications. ISBN-13: 978-0393614022. The bookstore will have the loose-leaf edition (best price) and used texts. But, please search amazon, ebay, and others to get a good deal on a used textbook.

Grading:
Homework Quizzes: 25%
In-class Quizzes 25%
Tests: 100 points each: 40%
Final Exam 100 points 10%

Missed Classes or Exams: These require a doctor's note or other official note explaining why you could not attend the class or exam. Make up exams will be given for valid written excuses. Make up in-class quizzes will be done for valid written excuses in professor's office. Make-up exams (an alternative short answer exam) or in-class quizzes must be done no later than 1 week after the class or exam. There will be no make-up for missed homework quizzes as these are available for weeks before class. PLEASE read the end of this "How to Get an "A" about Secure Exams.

Learning assistants: Learning Assistants (LAs) walking around helping you with the problem solving, and calculations. All the LAs have had the course before and scored really high grades. Further they have a passion about biochemistry and teaching you biochemistry so that you can independently solve the problems and analyze case study data. The class when full is 100 students, we will have 4 LAs so it is to your distinct advantage to ask questions and engage the LA as much as possible. The LAs will have Office Hours once a week for you to visit and ask questions and get help for the upcoming class. It is to your distinct advantage to come to the Office Hours with a list of things you want to discuss and learn.

Tentative Schedule*

Day	Date	Topic
Tuesday	**8/21/18**	**Ch0 Introduction to the Flipped, Class Syllabus Quiz**
Thursday	**8/23/18**	**Ch01 Some Basics, Ch02a Energy, Water pKa problem solving, Thermodynamics**
Tuesday	**8/28/18**	**Ch02bc buffers, membranes**
Thursday	**8/30/18**	**Ch03abc DNA Structure**
Tuesday	**9/4/18**	**Ch04abc Amino acids/Protein, pKa's, charges, Protein Structure**
Thursday	**9/6/18**	**Exam 1**
Tuesday	**9/11/18**	**Ch05abcd Protein Chemistry**
Thursday	**9/13/18**	**Ch6ab**

Tuesday	**9/18/18**	**Ch06cd Protein Function, Ch7abc Enzymes**
Thursday	**9/20/18**	**Ch7de Enzymes**
Tuesday	**9/25/18**	**Exam 2**
Thursday	**9/27/18**	**Ch08 Cell Signaling Systems**
Tuesday	**10/2/18**	**Ch09abc Glycolysis**
Thursday	**10/4/18**	**Ch09de**
Tuesday	**10/9/18**	**Ch10abcde, Citrate Cycle (TCA)**
Thursday	**10/11/18**	**Ch 11ab Electron Transport**
Tuesday	**10/16/18**	**Exam 3**
Thursday	**10/18/18**	**Ch11cde Oxidative Phosphorylation**
Tuesday	**10/23/18**	**Ch12 Photosynthesis, Ch13ab**
Thursday	**10/25/18**	**Ch13bc Carbohydrate Structure-Function**
Tuesday	**10/30/18**	**Ch14abcd, Carbohydrate Metabolism**
Thursday	**11/1/18**	**Ch15ab Lipid Structure + Function**
Tuesday	**11/6/18**	**Exam 4**
Thursday	**11/8/18**	**Ch15cd**
Tuesday	**11/13/18**	**Ch16a Lipid Metabolism**
Thursday	**11/15/18**	**Ch16bc**
Tuesday	**11/20/18**	**Ch17ab Amino Acid Metabolism**
Thursday	**11/22/18**	**No Class- Give Thanks**
Tuesday	**11/27/18**	**Ch17cd**
Thursday	**11/29/18**	**Exam 5**
Tuesday	**12/4/18 5-7 pm**	**Final Exam (ACS Biochemistry Core Exam)**

*Syllabus is subject to change at the discretion of the instructor