

Chemistry 560
General Biochemistry
Fall 2014

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- Course time:** 11:00 a.m. - 12:15 p.m., Tues. & Thurs., PG 242
- Office hours:** Tues. 1:00 - 2:00 p.m. & Thurs. 9:00 - 10:00 a.m., OR
Call or e-mail to make an appointment, OR
Drop by my office/lab (CSL 325)
- Textbook:** Fundamentals of Biochemistry, Fourth Edition (2012)
D. Voet, J. Voet & C.W. Pratt (John Wiley & Sons, Inc.)

The course:

Prerequisites-General Chemistry, Organic Chemistry, General Biology

Course description-Biochemistry is an attempt to describe the complex traits of biological systems in terms of the molecules that make up living things. It is an active area of experimental science. As such, its theories are constantly being reworked and refined as new biological systems are discovered and characterized. The goal of this course is to introduce to students of chemistry the basic concepts required for advanced study of biochemistry including metabolism, signal transduction, and molecular biology. Furthermore, students with interests in biotechnology, life sciences, and molecular medicine will gain a working vocabulary and understanding of the molecules that drive these fields.

Expected student learning objectives-

Students who successfully complete this course will be able to:

- (i) identify the structures and chemical properties of important biomolecules and biopolymers. These include nucleotides and nucleic acids; amino acids and proteins, carbohydrates and polysaccharides, and lipids and membranes;
- (ii) classify protein structural hierarchy and illustrate how it relates to protein function;
- (iii) describe the principles that drive membrane structure and function;
- (iv) quantitatively characterize enzymes (protein catalysts), calculate enzymatic constants, and classify types of enzymatic regulation.

Please note-To be successful in this course, you must develop a working familiarity with a vast amount of material. Be prepared to dedicate sufficient time each week to stay current with your reading and studying. You will need to read an average of 20-30 pages of text each week. However, not all of the chapters will be covered in their entirety. Please consult the “Reading” column in the lecture schedule on pages 3 and 4 of this syllabus to identify chapter pages from which quiz and exam material will be taken. This is not a course for which one can cram the night before an exam. However, neither is this the most complicated material with which you will be presented during your science education.

*Resources available to students-*Your textbook is the primary resource for this course. Lecture will closely follow the sequence and organization of the text. A concise list of “lecture goals” will be included with each lecture. The purpose of outlining the lecture goals is to aid students in studying for exams. The slides used in lectures will be posted to the Blackboard site 24 hours prior to lecture. This is to aid students in note taking and reinforce the lecture goals during study.

*Homework-*There will be no graded homework assignments. Approximately once each week a page or so of “homework problems” will be posted on the Blackboard site under the tab “Problem sets”. The purpose of these problem sets is to help students test themselves on principles covered in lecture and prepare for exam questions. It is highly recommended that students work through these problems as well as those recommended from the “Problems” section at the end of each chapter in the Voet, Voet, & Pratt text.

*Exams and grading-*There will be two quizzes, two mid-term exams, and a cumulative final. The point distribution is as follows:

Quizzes (20 min) 30 points each **60** points total

Midterms (75 min) 100 points each **200** points total

Final exam (150 min) 190 points **190** points

Total 450 points

Chemistry 560, Fall 2014

SCHEDULE

Date	Topic	Reading
Aug 26	Introduction Biochemistry is chemistry of life	
Aug 28	Energy in biological systems	Ch. 1 (1-19)
Sep 2	Water, acids, bases, and buffers	Ch. 2 (22-37)
Sep 4	Nitrogenous bases, nucleosides, and nucleotides	Ch. 3 (40-43)
Sep 9	Nucleic acids and the Central Dogma	Ch. 3 (44-51)
Sep 11	Quiz 1 (Chapters 1-2; last 20 minutes of class) Nucleic acid sequencing	Ch. 3 (51-62)
Sep 16	Recombinant DNA technology	Ch. 3 (62-72)
Sep 18	Amino acids	Ch. 4 (76-90)
Sep 23	Protein purification and analysis	Ch. 5 (93-105)
Sep 25	Protein sequencing and evolution of proteins	Ch. 5 (106-122)
Sep 30	Exam 1 (Chapters 1-5)	
Oct 2	Protein secondary structure	Ch. 6 (127-141)
Oct 7	Protein tertiary and quaternary structure	Ch. 6 (142-156)
Oct 9	Protein stability and folding	Ch. 6 (156-172)
Oct 14	Protein function: Myoglobin and hemoglobin	Ch. 7 (176-196)
Oct 16	Protein function: Muscle contraction	Ch. 7 (197-207)
Oct 21	Protein function: Antibodies	Ch. 7 (208-213)
Oct 23	Quiz 2 (Chapters 6-7; last 20 minutes of class) Monosaccharides	Ch. 8 (217-223)
Oct 28	Polysaccharides and glycoproteins	Ch. 8 (224-238)

Oct 30	Lipids	Ch. 9 (241-254)
Nov 4	Lipid bilayers and membrane proteins	Ch. 9 (255-264)
Nov 6	Biological membranes	Ch. 9 (265-285)
Nov 11	NO CLASS—VETERAN’S DAY HOLIDAY	
Nov 13	Facilitated transport across membranes	Ch. 10 (288-303)
Nov 18	Active transport across membranes	Ch. 10 (304-311)
Nov 20	Exam 2 (Chapters 6-10)	
Nov 25	Enzyme catalysis	Ch. 11 (315-323)
Nov 27	NO CLASS—THANKSGIVING DAY HOLIDAY	
Dec 2	Catalytic mechanisms: Serine Proteases	Ch. 11 (323-332) (339-351)
Dec 4	Enzyme kinetics	Ch. 12 (355-367)
Dec 9	Enzyme inhibition	Ch. 12 (368-376)
Dec 11	Enzyme regulation	Ch. 12 (376-385)
Dec 16	Final Examination (Chapters 1-12) 10:30 a.m. - 1:00 p.m. PG 242	