Chemistry 560
General Biochemistry
Spring 2019

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Course time: 11:00 a.m. - 12:15 p.m., Tues. & Thurs., EBA 439

Office hours: Tues. 1:00 - 2:00 p.m. and Wed. 9:00 - 10:30 a.m., OR
Call or e-mail to make an appointment

Textbook: Fundamentals of Biochemistry, Fifth Edition
D. Voet, J. Voet & C.W. Pratt (John Wiley & Sons, Inc.)

NOTE: The Campus Bookstore is offering a $59.00 enhanced eBook version of the text (ISBN: 9781119435006) that includes sample calculation videos, interactive exercises, and animated process diagrams. You may also purchase a print companion version to the eBook (ISBN: 9781119553571) at the Bookstore for an additional $72.99.

The course:

Prerequisites-General Chemistry, Organic Chemistry, General Biology

Course description-This course serves as a general introduction to the field of biochemistry, as well as the prerequisite for a series of upper level biochemistry elective courses (Chem 562, Chem 563, Chem 564, and Chem 567). 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 provide students with the tools to succeed in upper division courses that require an understanding of biomolecules. Furthermore, students with interests in biotechnology, life sciences, and molecular medicine will gain a working vocabulary and understanding of the molecules and processes that drive these fields.

Expected student learning objectives-
Each student who successfully completes 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) relate molecular structure to biological function;
(iii) describe the principles that drive membrane structure and function;
(iv) quantitatively characterize enzymes (protein catalysts), calculate enzymatic constants, and classify types of enzyme inhibition

***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 exam material will be taken. This is not a course for which one can cram the night before an exam. Neither is this the most complex material with which you will be presented during your science education.**

Resources available to students-The text is the primary resource for this course. Lecture will closely follow the sequence and organization of the text and is intended to clarify particularly complicated points and connect theoretical concepts to familiar ideas. Lectures will be recorded on video and posted under the "Lecture Recordings" tab on Blackboard. A short 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 prior to lecture. This is to aid students in note taking and reinforce the lecture goals during study. I will post an exam "Review Sheet" summarizing all the lecture goals that will be tested one week before an exam. Use this to test your preparation for exams. Make good use of office hours to ask questions about material you find confusing before you encounter it on your exam.

Homework-There will be no graded homework assignments. "Problem Sets" with challenging sample questions from past exams will be posted regularly on the Blackboard site, as will their "Answer Keys." The purpose of these problem sets is to help students prepare for exam questions. It is highly recommended that students attempt these problems, as well as the recommended problems present at the end of chapters in the Voet, Voet, and Pratt text and bring their questions to office hours.

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

- Quizzes (20 min) 25 points each, **100** points total
- Mid-term Exams (75 min) 100 points each, **200** points total
- Final exam (120 min) **160** points—the final exam is cumulative with approximately 60 points taken from the last four lectures and 100 points from the previous 22 lectures

Course grades will be assigned based on total points earned out of 460 points possible

Chemistry 560, Spring 2019

SCHEDULE

Date	Topic (Lecture number)	Reading
Jan 24	Introduction Biochemistry is chemistry of life (1)	
Jan 29	Energy in biological systems (2)	Ch. 1 (1-20)
Jan 31	Water and noncovalent interactions (3)	Ch. 2 (23-31)
Feb 5	Acids, bases, and buffers (4)	Ch. 2 (31-39)
Feb 7	Nitrogenous bases, nucleosides, and nucleotides (5) **Quiz 1** (Lectures 1-4; last 20 minutes of class)	Ch. 3 (42-45)
Feb 12	Nucleic acids and the Central Dogma (6)	Ch. 3 (46-53)
Feb 14	Polymerases and nucleic acid synthesis (7)	Ch. 3 (53-66)
Feb 19	Recombinant DNA technology (8)	Ch. 3 (66-76)
Feb 21	Amino acids (9) **Quiz 2** (Lectures 5-8; last 20 minutes of class)	Ch. 4 (80-94)
Feb 26	Protein purification and analysis (10)	Ch. 5 (94-109)
Feb 28	Protein sequencing and evolution of proteins (11)	Ch. 5 (110-126)
Mar 5	**Mid-term Exam 1** (Chapters 1-5; Lectures 1-11)	
Mar 7	Protein primary and secondary structure (12)	Ch. 6 (131-145)
Mar 12	Protein tertiary and quaternary structure (13)	Ch. 6 (145-159)
Mar 14	Protein stability and folding (14)	Ch. 6 (160-176)
Mar 19	Protein function: Myoglobin and hemoglobin (15)	Ch. 7 (180-200)
Mar 21	Protein function: Antibodies (16) **Quiz 3** (Lectures 12-15; last 20 minutes of class)	Ch. 7 (212-217)
Mar 26	Monosaccharides (17)	Ch. 8 (221-227)

Mar 28	Polysaccharides and glycoproteins (18)	Ch. 8 (228-242)
Apr 2	NO CLASS—SPRING RECESS	
Apr 4	NO CLASS—SPRING RECESS	
Apr 9	Lipids (19)	Ch. 9 (245-261)
Apr 11	Membrane proteins and membrane structure (20) **Quiz 4** (Lectures 16-19; last 20 minutes of class)	Ch. 9 (262-276)
Apr 16	Facilitated transport across membranes (21)	Ch. 10 (293-309)
Apr 18	Active transport across membranes (22)	Ch. 10 (309-318)
Apr 23	**Mid-term Exam 2** (Chapter 6-10; Lectures 12-22)	
Apr 25	Enzyme catalysis (23)	Ch. 11 (322-339)
May 2	Enzyme mechanisms: Serine proteases (24)	Ch. 11 (345-357)
May 7	Enzyme kinetics (25)	Ch. 12 (361-371)
May 9	Bisubstrate mechanisms and enzyme inhibition (26) Review for Final Exam	Ch. 12 (371-382)
May 14	**Final Exam** (Chapters 1-12; Lectures 1-26) **10:30 a.m. - 12:30 p.m.** **EBA 439**	