

CHEM523: Biochemistry I

Instructor: Dr. Takita F. Sumter (sumtert@winthrop.edu)

Course Meeting Time: MWF 9:30-10:45am, Sims 113C

Office hours: WF 11:00a-12:00p; by appt

Contact the instructor: Office: Sims 302C Phone: 323-4991

Course Goals: CHEM 523 provides an in depth study of the structure, chemistry and macromolecular interactions of biochemical systems. In doing so, this course covers enzyme kinetics and mechanisms, thermodynamics of biological processes, and the basic principles of relevant techniques used in biochemistry and molecular biology. These goals enable students to **think critically and solve problems (ULC #1)** while also providing them the skills needed to **understand the interconnected nature of the world and time in which they live (ULC #4)**.

Student Learning Outcomes: In accordance with the goals of the ACS/ASBMB Accredited Biochemistry Program, students will demonstrate the following skills upon course completion:

- Understand the function of living systems with particular attention to connections between structure and function
- Know the physical and biochemical properties of proteins, nucleic acids, lipids, and polysaccharides
- Understand the kinetic and energetic transformations associated with biochemical processes (i.e. enzymatic reactions, binding interactions, and conformational changes)
- Appreciate the biochemistry that underlies replication, transcription, and translation
- Be able to evaluate, critically analyze, and make logical inferences from biochemical data published in primary literature.

Text and Web resources: Fundamentals of Biochemistry, 4th Edition. by Voet, Voet, & Pratt. This course will also use a blackboard shell for lecture support resources.

Course Requirements:

- **On-line or In-class Quizzes (100 points):** Quizzes (5 quizzes at 20 points each) will be given at the beginning of class or on blackboard and will most often cover the most important topics since the previous quiz and related homework problems. **No makeup quizzes will be given.**
- **Active Learning Exercises (150points):** Five lecture sessions have been committed to active learning exercises where students will use their knowledge of biochemistry to solve case studies problems. Group assignments will be made and a single group grade will be assigned. Each assignment is worth 30 points.
- **Exams (750 points):** There will be three exams worth **150 points each**. The tentative dates for these exams are outlined on the course schedule. **No makeup exams will be given.** A comprehensive final exam worth **300 points** covering all topics from this course will also be given.

You must take the final exam in order to pass the course. **The final will be given on Tuesday May 5th at 11:30am.**

The purpose of exams:

- Ranking students for grading.
- Provide learning experiences both for students and instructors--learning new information, learning how well you understand or discovering what you don't understand, learning what needs to be presented differently next time, learning who needs help.
- Multiple choice and short answer exam questions will be given at the beginning of each exam to test knowledge of basic concepts. However, because I am personally interested in how you can use what you know to demonstrate your understanding, many of my exam questions will emphasize problem-solving (**often involving new information and different situations**) and require narrative responses.

CHEM 523 Sect. 001 (3 Credit Hours), Spring 2015 Course Syllabus

- The best method of preparation for exams is to **develop an in depth knowledge of the material** and test this knowledge by treating homework problems as test questions. Be sure to discuss your rationale with classmates so that you will be able to clearly and logically communicate your reasoning on an exam.
- **Additional Requirements for Graduate Credit:** Students receiving graduate credit (both non-degree seeking and those working toward a degree) will be required to complete a 5-7 page paper on a controversial topic related to biochemistry. A proposal describing the topic, its relevance to this course, and the controversy must be submitted by Friday, March, 13, 2015. This paper must cite at least 7 primary literature sources and must be submitted by Friday, April 24, 2015. A 20 minute oral presentation of your paper will be scheduled and presented to the class. The paper and presentation are each worth 50 points to give the course total for graduate students 1100. Graduate students should also be aware that Winthrop's +/- grading system is not applicable to courses taken for graduate credit. Grades will be assigned as follows: 93%-100% A; 85%-92% B, 76%-84% C, 59%-75% D, 58% or below F.

Grading: Final grades will be assigned using the Plus/Minus grading system. Your grade will be based on the total points that you earn as follows: 920-1000 = A, 860-919 = B⁺, 800-859 = B, 760-799 = C⁺, 700-759 = C, 660-699 = D⁺, 600-659 = D, 599 or less = F

Academic Misconduct: Winthrop has a strict Student Conduct Code printed in the Winthrop University Student Handbook. Read it carefully and avoid any infractions such as cheating or plagiarism.

Students with Disabilities: Winthrop University is dedicated to providing access to education. If you have a disability and need accommodations, please contact the Coordinator of Services for Students with Disabilities, at 323-3290, as soon as possible. Once you have your Professor Notification Form, you should show it to me so that appropriate accommodations can be made.

Student Responsibility: This is a rigorous upper level course. Average students should spend at least 9 hours per week preparing. Suggestions for preparation:

- Pre-read assignments. Read assignments before class so that you will be able to take good notes and engage in active lecture discussions. After the lecture, it is wise to review material covered while it is fresh in your memory and complete assigned homework.
- Attend classes. In accordance with University policy, students must attend at least 75% of the classes to pass the course. Attendance and tardiness will be considered in the case of borderline grades. All missed work, lecture notes and announcements must be obtained from other students in the class.
- Devote time to this class each day. It will result in success on quizzes, in-class activities, and exam preparation.
- Work assigned problem sets. These reinforce learning and provide exam practice.
- Meet with your classmates. Form study groups of 3 or 4 that meet regularly. Include at least one person that you did not know before the semester. Try a variety of study techniques during your meetings.

Week Day	Date	Topic	Lecture Reading
Monday	Jan-12	Intro - Review - Solvent of Life	Chapters 1-2
Wednesday	Jan-14	Properties of Water/Acid Base Ionization	Ch. 2
Friday	Jan-16	Active Learning--Amino Acids	Ch. 2
Monday	Jan-19	NO CLASS--MLK Holiday	
Wednesday	Jan-21	Nucleic Acid Structure and Genetic Information	Chapter 3 and 24.1
Friday	Jan-23	Nucleic Acid Structure and Molecular DNA Manipulation	Chapter 3 and 24.1
Monday	Jan-26	Introduction to Amino Acids	Ch.4
Wednesday	Jan-28	Amino Acids/Protein Structure	ch.4 and 5
Friday	Jan-30	Active Learning-Protein Structure (out of class)	Chapter 6
Monday	Feb-2	Active Learning--Protein Structure	Chapter 6
Wednesday	Feb-4	Protein Function: Models of Structure/Function Axes	Ch. 7
Friday	Feb-6	No class	Chapter 7
Monday	Feb-9	Protein Function: Models of Structure/Function Axes	Chapter 7
Wednesday	Feb-11	Exam I	
Friday	Feb-13	No class	
Monday	Feb-16	Lipids and Biological Membranes	Ch. 9
Wednesday	Feb-18	Lipids and Biological Membranes	Ch. 9
Friday	Feb-20	No class	Ch. 9
Monday	Feb-23	Membrane Transport	Ch. 10
Wednesday	Feb-25	Membrane Transport	Ch. 10
Friday	Feb-27	Active Learning--Lipids and Membranes (out of class)	Ch. 10
Monday	Mar-2	Introduction to Enzymes	Ch. 11
Wednesday	Mar-4	cont'd	Ch. 11
Friday	Mar-6	No class	
Monday	Mar-9	Enzyme Kinetics	Ch. 12
Wednesday	Mar-11	Enzyme Regulation	Ch. 12
Friday	Mar-13	Active Learning-Enzyme Kinetics and Regulation (out of class)	Ch. 12
Monday	Mar-16	Spring Break--No Class	
Wednesday	Mar-18	Spring Break--No Class	
Friday	Mar-20	Spring Break--No Class	
Monday	Mar-23	Introduction to Metabolism	
Wednesday	Mar-25	cont'd	
Friday	Mar-27	No-Class	
Monday	Mar-30	Exam II	
Wednesday	Apr-1	NO CLASS	
Friday	Apr-3	Intro to Metabolism and Signalling	Ch. 13-14
Monday	Apr-6	Enzymes in Action: Intro to Metabolism and Signalling	Ch. 13-14
Wednesday	Apr-8	Enzymes in Action: Intro to Metabolism and Signalling	Ch. 13-14
Friday	Apr-10	Active Learning-Metabolism (out of class)	
Monday	Apr-13	cont'd	Ch. 25
Wednesday	Apr-15	DNA Repair, Recombination, and Methylation	Ch. 26
Friday	Apr-17	Active Learning-DNA Replication and Repair	Ch
Monday	Apr-20	The Ribosome and Translation	Chapter 27
Wednesday	Apr-22	Regulation of Gene Expression	Chapter 28
Friday	Apr-24	EXAM III	
Monday	Apr-27	Final Exam discussion--Review	
Tuesday	4-May	FINAL EXAM 11:30am	

*Note: This course schedule is tentative. The instructor will notify students of changes verbally or via email