

CHEM523: Biochemistry I

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

Course Meeting Time: TR 8:00-9:15am, Sims 209

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

Office hours: MT 1:00p-2:00p; by appt

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 (100points):** 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.
- **Written Synthesis Paper (50points):** Each student must submit a 3-page written synthesis of the current understanding of a specific protein. The protein will be assigned and papers, with in-text citations using ACS format, are due by the last day of class.
- **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 Wednesday Dec 9th at 8:00am.**

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.

- 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 Honors Credit:** Students taking CHEM 523H must complete an additional laboratory exercise in CHEM 525 and must deliver a 20 minute power-point presentation of the theoretical aspects of the technique and associated findings in CHEM 523 lecture. The topic must be cleared by Drs. Hurlbert and Sumter.
- **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 **Tuesday, October, 13, 2015**. This paper must cite at least 7 primary literature sources and must be submitted by **THURSDAY, NOVEMBER 19, 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 graduate 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.

Meeting Day	Date	Topic	Reading Assignment	Notes
Tuesday	25-Aug	Introduction-Intermolecular Forces	Chapters 1-2	
Thursday	27-Aug	Properties of Water/Acid Base Ionization	Ch. 2	
Tuesday	1-Sep	Blood Buffers/Quiz	Ch. 2	Quiz 1
Thursday	3-Sep	Amino Acids/Peptide structure	ch.4 and 5	
Tuesday	8-Sep	Three Dimensional Protein Structure	ch.4 and 5	
Thursday	10-Sep	Three Dimensional Protein Structure	Chapter 6	Active Learning Due
Tuesday	15-Sep	Protein structure	Chapter 6	
Thursday	17-Sep	Protein purification		
Tuesday	22-Sep	Myoglobin and Hemoglobin	Ch. 7	Quiz 2
Thursday	24-Sep	Myoglobin and Hemoglobin	Chapter 7	
Tuesday	29-Sep	Exam I		
Thursday	1-Oct	Carbohydrates	Ch. 8	
Tuesday	6-Oct	Carbohydrates/Intro to Lipids	Ch. 8-9	
Thursday	8-Oct	Lipids and Biological Membranes	Ch. 9	
Tuesday	13-Oct	FALL BREAK		Quiz 3
Thursday	15-Oct	Lipids and Biological Membranes	Ch. 9	
Tuesday	20-Oct	Membrane Transport	Ch. 10	
Thursday	22-Oct	Enzyme Mechanisms	Ch. 11	
Tuesday	27-Oct	Enzyme Mechanisms/Kinetics	Ch. 11 and 12	Quiz 4
Thursday	29-Oct	Enzyme Kinetics	Ch. 12	
Tuesday	3-Nov	Enzyme Inhibition/Regulation	Ch. 12	
Thursday	5-Nov	Exam II		Active Learning Due
Tuesday	10-Nov	Intro to Metabolism and Signalling	Ch. 13-14	
Thursday	12-Nov	Signalling cont'd/Nucleic Acids	Ch. 14 and Ch. 3	
Tuesday	17-Nov	Replication, Repair, & Recombination	Ch. 24-25	Quiz 5
Thursday	19-Nov	Transcription	Ch. 26	
Tuesday	24-Nov	Protein Synthesis	Ch. 27	
Thursday	26-Nov	Thanksgiving Break		
Tuesday	1-Dec	Protein Synthesis	Ch. 27	Active Learning Due
Thursday	3-Dec	Exam III		
Wednesday	9-Dec	FINAL EXAM 8:00am		

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