**CHEM523: Biochemistry I**

**General Course Information:**

**Instructor:** Dr. Takita F. Sumter **Email:** sumtert@winthrop.edu

**Phone: Office:** 323-4991 **Office:** Sims 314A

**Office Hours:** MW 11:00a-12:00p; T 11:00a-12:00p

**Meeting Time:** MWF 9:30-10:20 Sims 113C **Credit Hours:** 3 Credit hours

**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.

**Course Objectives:** In accordance with the goals of the American Chemical Society’s Biochemistry Program and the Winthrop University Touchstone program, you should be able to do the following upon completion of this course:

* Understand the function of living systems
* Know the chemistry of proteins, nucleic acids, lipids, and carbohydrates
* Understand the kinetic and energetic transformations associated with biochemical processes

(i.e. enzymatic reactions, binding interactions, and conformational changes)

* Be able to evaluate, critically analyze, and make logical inferences from biochemical data published in primary literature.

**Text:** *Biochemistry* by Garrett and Grisham, 4th edition. *Required*

**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 are your responsibility and 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.
	+ ***Be honest.*** Winthrop has a strict Student Conduct Code Responsibility which is available online and may be accessed at www2.winthrop.edu/studentaffairs/handbook/StudentHandbook.pdf. As noted in this document “Responsibility for good conduct rests on students as adult individuals.” You are encouraged to read this policy carefully and avoid any infractions such as cheating or plagiarism.

**Course Requirements:**

* **Quizzes (150 points):** Quizzes (6 quizzes at 15 points each) will be given at the beginning of class and will most often cover the most important topics since the previous quiz and related homework problems. **No makeup quizzes will be given.**
	+ We will have various exercises that introduce students to evaluating primary literature sources. The average score on these assignments will replace the lowest quiz grade.
	+ **Exams (850 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 **400 points** covering all topics from this course will also be given. You must take the final exam in order to pass the course.

**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.

**The final will be given on Tuesday December 15th at 11:30am.**

* + ***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, October 16, 2009. This paper must cite at least 7 primary literature sources and must be submitted by Friday, December 4, 2009. A 20 minute oral presentation of your paper will be presented to the class (see schedule). 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:** Your Final grade 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

**Student Outcomes:**  Successful students in this course will demonstrate a clear understanding of the essential features of modern biochemistry that govern the properties and behaviors of living systems. It is also critical that students develop the ability to critically analyze and synthesize these concepts so that they are equipped to understand and investigate various areas of science independently. Specific measures of these outcomes will be based on exam performance.

**Students with Disabilities:** Winthrop University is dedicated to providing access to education.  If you have a disability and need accommodations, please contact Gena Smith, Coordinator, 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 arrangements can be made.

**Course Schedule:** This schedule is tentative and subject to change based on what is perceived by the professor to be best for all students. Changes to exam dates will be announced at least one week prior to the new date.

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| **Date** | **Textbook Reading** | **Suggested Reading and Problems** |
| 8/26 W | Introduction/ Review of General Chem/Biol  | Ch. 1 |
| 8/28 F | Continued Review of Fundamentals (Ch. 2 Buffers)/PBL Acids and Bases | Ch. 2 : 1, 9, 12, 16, 23, 24 |
| 8/31 M | Buffers cont’d |
| 9/2 W | Amino Acids | Ch. 4: 5, 6, 12, 13, 16 |
| 9/4 F | Amino Acids (cont’d) |
| 9/7 M | Protein Primary Structure/Purification Techniques | Ch. 5: 1, 2, 5, 11, 12, 15*also covering* Appendix to Ch. 5 |
| 9/9 W | Protein Primary Structure (cont’d) |
| 9/11 F | Cont’d |
| 9/14 M | Con’d |
| 9/16 W |  Proteins Structure: 2°, 3°, and 4°  | Ch. 6: 1, 3, 4,16 |
| 9/18 F | Cont’d |
| 9/21 M |  Cont’d  |
| 9/23 W | Problem Based Learning of Protein Structure/ Intro to Carbohydrates |  |
| 9/25 F | EXAM I (Ch. 1-6) [LEARNING OBJECTIVES FOR EXAM I](file:///C%3A%5CDocuments%20and%20Settings%5Csumtert%5CMy%20Documents%5CTEACHING%5CFall%202009%5Cwebpage%5Cchem523%20learning%20objectives.pdf) |
| 9/28 M | Carbohydrates | Ch. 7: 1, 2, 13 |
| 9/30 W | Carbohydrates and Glycoconjugates  |
| 10/2 F | Cont’d  |
| 10/5 M | Lipids | Ch. 8: 2, 6, 16, 18,20 |
| 10/7 W | Lipids and Membranes | Ch. 9: 1, 7, 9, 10, 15, 21 |
| 10/9 F | Membrane Transport |
| 10/12 M | Cont’d/ Intro to Nucleic Acids | Ch. 10: 1, 5, 10, 13, 16 |
| 10/14 W | Nucleic Acids (cont’d) |
| 10/16 F | Cont’d  |
| 10/17-20 | **FALL BREAK (NO CLASS)** |
| 10/21 W | Nucleic Acids (cont’d)/Intro to Enzymes |  |
| 10/23 F | EXAM II (Ch. 7-11) [LEARNING OBJECTIVES FOR EXAM II](file:///C%3A%5CDocuments%20and%20Settings%5Csumtert%5CMy%20Documents%5CTEACHING%5CFall%202009%5Cwebpage%5CLEARNING%20OBJECTIVES%20FOR%20CHEM%20523%20EXAM%20II.doc) |
| 10/26 M | Enzyme Kinetics | Ch. 13:1, 2, 4, 11**WITHDRAWAL DEADLINE** |
| 10/28 W | Enzyme Inhibition | Ch. 14: 1. 2, 7, 10, 12-18 |
| 10/30 F | Cont’d |
| 11/2 M | Cont’d  |
| 11/4 W | Mechanisms of Enzyme Action | Ch. 15: 3, 6, 10, 13, 15 |
| 11/6 F | Cont’d |
| 11/9 M |  Cont’d  |
| 11/11 W | Hemoglobin/Myoglobin Models |
| 11/13 F | Cont’d |  |
| 11/16 M | Cont’d |  |
| 11/18 W | EXAM III (Ch. 13-15) [LEARNING OBJECTIVES FOR EXAM III](file:///C%3A%5CDocuments%20and%20Settings%5Csumtert%5CMy%20Documents%5CTEACHING%5CFall%202009%5Cwebpage%5Clearning%20objectives%20exam%20iii.docx) |
| 11/20 F | Introduction to Metabolism  | Ch. 17: TBA |
| 11/23 M | Cont’d |  |
| 11/25-27  | **Thanksgiving Holiday (NO CLASS)** |
| 11/30 M | Cont’d |  |
| 12/2 W | Graduate Student Presentation/Course Evaluation |  |
| 12/4 F  | Review |  |
| 12/7 M | **Special Topics Lecture** |  |
| 12/15 T | **FINAL EXAM 11:30AM** |