**CHEM523: Biochemistry I**

**General Course Information:**

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

**Phone: Office:** 323-4991 **Office:** Sims 302

**Office Hours:** TR 9:30-10:30; W 1:00-2:00 and by appointment

**Meeting Time:** TR 8:00-9:15am, Sims 113C

**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.
* Have a general appreciation for the biochemical processes governing energy generation via glycolysis and the citric acid cycle.

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

**Course Requirements:**

* **Quizzes (100 points):** Quizzes (4 quizzes at 25 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.** 
  + **Problem Sets (50 points):**  Problem sets will be due on the dates outlined in the syllabus. These will only be collected during lecture and **late assignments will not be accepted**.
  + **Exams (700 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 **250 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 Thursday December 9th at 8am.**

* + ***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 Thursday, March 10, 2011. This paper must cite at least 7 primary literature sources and must be submitted by Thursday, April 21, 2011. 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:** 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:

780-850 = A, 730-849 = B+, 680-729 = B, 645-679 = C+, 595-644 = C,

560-594= D+, 510-559 = D, 509 or less = F

**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 printed in the Winthrop University Student Handbook. Read it carefully and avoid any infractions such as cheating or plagiarism.

**Student Outcomes:**  Successful students in this course will clearly understand 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. Outcomes for student learning for each section of the course are outlined in the learning objectives.

**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 at the professor’s discretion. Changes to exam dates will be announced in lectures and sufficient notice will be given.

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| **Date** | **Textbook Reading** | **Class prep. assignments** |
| 1/11 T | Introduction/ Properties of Water  (Ch. 2) | **READ and Review Ch. 1**  Ch. 2: 1, 5, 9, 13, 16, 24 |
| 1/13 Th | Buffers (Ch. 2 cont’d) |
| 1/18 T | Amino Acids (Ch. 4)- | Ch. 4: 1,2, 3, 5, 16, 18, 19  **Problem set 1 Due**  **Know ALL Amino Acid Structures** |
| 1/20 Th | Protein Structure I (Ch. 5) | Ch. 5: 1, 2, 5, 11, 12, 14, 15  *also covers appendix to Ch. 5*  Ch. 6: 1, 3, 7, 9, 14  **Be able to accurately draw peptides** |
| 1/25 T | Protein Structure I (cont’d) –**Quiz 1** |
| 1/27 Th | Protein Structure II (Ch. 6) |
| 2/1 T | Cont’d |  |
| 2/3 Th | **EXAM I** | |
| **2/8 T** | Enzyme Behavior (Ch. 13) | Ch. 13: 1,2,4,11 |
| 2/10 Th | Cont’d | **Problem set 2 Due** |
| 2/15 T | Cont’d |
| 2/17 Th | Enzyme Mechanisms/Regulation (Ch.14-15) | Ch. 14: 1, 12-16  Ch. 15: 2, 5, 12,13  **Understand Hb and Mb Function** |
| 2/22 T | Hb and Mb-**Quiz 2** |  |
| 2/24 Th | Cont’d | **Problem Set 3 Due** |
| 3/1 T | Lipids (Ch. 8) | Ch. 8: 1, 3, 7, 20, 22 |
| 3/3 Th | Cont’d |  |
| 3/8 T | **EXAM II** | |
| 3/10 Th | Lipids and Membranes (Ch. 8-9) | Ch. 9:7, 8, 11, 13 |
| **3/14-18** | **Spring Break** | |
| 3/22 T | Lipids and Membranes (cont’d)- |  |
| 3/24 Th | Cont’d-**Quiz 3** | **Problem Set 4 Due** |
| 3/29 T | Introduction to Metabolism (Ch. 3, 17) | Ch. 17: 2, 3, 7, 8, 12, 15 |
| 3/31 Th | Cont’d |
| 4/5 T | Carbohydrates (Ch. 7) **Quiz 4** | Ch. 7: 1, 2, 3, 16  **Know the structures of ALL relevant carbohydrates** |
| 4/7 Th | Glycolysis (Ch. 18) | Ch. 18: 1, 3, 3, 7, 11  **Know the pathway with structures** |
| 4/12 T | **EXAM III** | |
| 4/14 Th | The Citric Acid Cycle (Ch. 19) | Ch. 19: 1,2,11  **Know the pathway with structures** |
| 4/19 T | Cont’d |
| **4/21 Th** | Cont’d**-Quiz 5** |
| 4/28 Th | **FINAL EXAM 8:00 am** | |