

# CHEMISTRY 35I: BIOCHEMISTRY

**Term:** Fall, 2007  
**Prerequisites:** Two semesters of Organic chemistry (CHEM 201 and 202). Quantitative chemistry (CHEM 250 from CSUSM or equivalent courses from another collage) with a minimum grade of C (grade point 2.0).  
**Class time:** 10.30 a.m. - 11.45 a.m. Tuesdays and Thursdays  
**Class location:** UNIV 100  
**Instructor:** S. Jayasinghe (Jay), Ph.D.  
**Inst. Office:** Sci II, 229  
**Inst. Office hours:** Mondays and Wednesdays from 1:00 p.m. to 2:30 p.m. or by appointment  
**Inst. Phone:** (760) 750-8075  
**Inst. E-mail:** *E-mail communication will be via WebCT. E-mails sent to the instructor's campus e-mail address will NOT be returned (unless in the case of an emergency). Use the instructor's campus e-mail ([sjayasin@csusm.edu](mailto:sjayasin@csusm.edu)) only in the case of an emergency.*

**Course Objective:** Intended for the science major the object of this course is to introduce the student to the fundamental concepts and language of biochemistry, and to the principles that govern the structure and behavior of biological macromolecules.

## Student Learning Outcomes:

Upon completion of this course students should be able to demonstrate their knowledge regarding:

- (1). the various forces that help maintain the structure of biological macromolecules.
- (2). the basic principles of thermodynamics as they apply to biochemical processes and how high energy molecules are utilized to provide the energy requirements of biological systems.
- (3). the structure and function of the important biological macromolecules: proteins, Carbohydrates, Lipids (and Nucleic acids). With regards to proteins students are expected to demonstrate:
  - (a). a detailed understanding of the different structural levels of proteins
  - (b). their knowledge of the forces that contribute to the formation of a proteins' unique three-dimensional structure
  - (c). their knowledge of methods utilized in protein purification
  - (d). their ability to use computational tools to gather information regarding the structure and function of proteins.
- (4). enzyme kinetics, enzyme specificity, the mechanisms of enzyme action, and enzyme regulation.

These are general learning outcomes. Students are responsible for everything we discuss in class and available to you through your textbook.

**Textbook (Required):** Biochemistry by R.H. Garrett and C. M. Grisham., 3<sup>rd</sup> Edition, Thompson, Books/Cole publishing.

**WebCT:** The course website can be accessed via the campus WebCT system. The following will be available or done through the WebCT site:

- (i). Posting of all assignments (including the term paper)
- (ii). Submission of all assignments and the return of graded assignments (*also see below*).
- (iii). E-mail communication with the instructor and receiving notices from the instructor.
- (iv). A calendar tool indicating important course/assignment dates.

- (v). The syllabus
- (vi). Lecture notes (*also see below*).
- (vii). Links to worthwhile biochemistry related web sites.

***If you are not already familiar with the use of WebCT (version 6) please consult the IITS help desk or the instructor as soon as possible.***

**Lecture Notes:** PDF files of lecture slides are available online via webCT. It is highly suggested that you print a copy of these files and bring it to class with you. These lecture notes should NOT be considered as a substitute for attending class. *You will notice that the notes contain more questions than answers.*

**Topic List:** Unless otherwise noted all chapters refer to the course textbook. Below is the topic list for CHEM 351 for the fall semester of 2007. Although every attempt will be made to adhere to this list I reserve the right to adjust the time spent on each topic as the semester progresses. **Read the relevant chapters in the textbook before the lecture.**

- Chapter 1. Chemistry is the Logic of Biological Phenomena
- Chapter 2. Water: The Medium of Life
- Chapter 3. Thermodynamics of Biological Systems
- Chapter 4. Amino Acids
- Chapter 5 (including appendix to chapter 5). Proteins: Their Primary Structure and Biological Function
- Chapter 6. Proteins: Secondary, Tertiary, and Quaternary Structure
- Chapter 13. Enzymes- Kinetics and Specificity
- Chapter 14. Mechanisms of Enzyme Action
- Chapter 15. Enzyme Regulation
- Chapter 7. Carbohydrates and the Glycoconjugates of Cell Surfaces
- Chapter 8. Lipids
- Chapter 9. Membranes and Membrane Transport
- Chapter 10. Nucleotides and Nucleic Acids
- Chapter 11. Structure of Nucleic Acids

**Exams:** There will be three (3) mid-semester exams and a final examination. The midsemester exams will be one hour in length. The final exam is two hours in length. The three mid-semester exams are scheduled as follows:

- 1<sup>st</sup> mid-semester exam – Thursday, September 27, 2007
- 2<sup>nd</sup> mid-semester exam – Thursday, November 1, 2007
- 3<sup>rd</sup> mid-semester exam – Tuesday, December 4, 2007

**The final examination is comprehensive, and is scheduled for, Thursday December 13, 2007 from 9:15 a.m. to 11:15 a.m.**

Make up examinations will only be given if the student has a valid excuse (severe illness, death in the family, etc.) and notifies the instructor prior to test time (if possible). No make-up examination will be given unless the instructor is notified of the emergency within two (2) days of the test.

Exams will contain multiple choice, short answer, and essay type questions. Please bring a scantron.

**Use of Electronic Devices:**

The use of cell phones, PDAs, or any other electronic device during exams is not allowed. Scientific calculators are permitted.

**Use of Cellular Phones:**

All cellular phones must be set to the silent mode. Please refrain from using your cellular phone during class. If you must answer your phone, due to an emergency, please leave the classroom.

**Assignments:**

A set of assignments (one to two page written reports) will be provided throughout the semester. These assignments will be available via WebCT. Due dates will be posted on WebCT. Although you may work in groups to complete these assignments, all submitted work must be your own. All assignments must be **submitted as PDF** files through the course web site on WebCT.

**Late submission will be assessed a 2% (of the assignment grade) penalty per day of lateness.**

**Term paper:**

Search the primary scientific literature and identify articles that **describe one particular aspect** (such as the structure, function, mechanism of action, etc.) of the protein you were assigned.

Primary scientific literature does NOT include articles found on the world wide web (unless it is the online version of a peer reviewed scientific journal).

Your term paper should be organized in the following manner:

- (a). Cover Page.
- (b). Brief Introduction (one half to one page)  
Your introduction should include a brief description of your protein (its name, its importance, its function, structural features etc.)
- (c). Review (three pages)  
Using a **minimum of five** (5) related articles write a review that summarizes the following information:
  - (i). Experimental approaches utilized
  - (ii). Results obtained
  - (iii). Discussion and/or conclusion of the authors

This summary section should be a well-written, coherent review of the literature on the particular chosen aspect of your protein.
- (d). Proposed Experimental Plan (one page)  
Write a description of two experiments that can be performed to generate new information regarding the structure or function of your protein. The proposed experiments must be new (have not yet been performed). Your description should include the following:
  - (i). your reasoning for choosing these experiments (i.e. why you think it is worthwhile to do these experiments).
  - (ii). a concise and general description of the experimental procedures you would employ.
- (e). References  
Use the format used in *Biochemistry*, or the *Journal of Biological Chemistry*.

The science librarian will be able to help you carry out your literature search using *medline* or *pubmed*. If you are not sure how to summarize the information, or are not clear what you should summarize, please see contact the instructor prior to spending significant time writing. Some journals may not be available at CSUSM. Get started on the literature search early so that you can obtain your articles through interlibrary loan in a timely manner.

Your paper should be a **minimum of five (5)** double spaced type written (using 12 point Times font) pages, excluding the cover and reference pages. **The paper should NOT exceed 8 pages.**

**The paper is due on the 6<sup>th</sup> of December 2007.** The paper must be submitted as a PDF file via WebCT. **WebCT (and the instructor) will not accept late submissions of the term paper.**

**Assignment and Term paper Submission:**

Assignments and the term paper **must be submitted as PDF files via WebCT.** Please DO NOT submit hard copies of your work. Submission of Microsoft word files is discouraged as it can lead to changes in document formatting.

Assignments and the Term paper should be properly paginated and should contain 1 inch margins.

**Grading (points):**

3 mid-semester examinations	150	37.5%
Assignments	100	25 %
Term paper	50	12.5%
Final examination	100	25 %
Total	400	100%

**Letter grades:**

Letter grades will be assigned based on the following cutoff values:

<b>Percentage</b>	<b>Grade</b>
90% and above	A
88 – 89.9%	B+
82.1 – 87.9%	B
80 – 82%	B-
78 – 79.9%	C+
72.1 – 77.9%	C
70 – 72%	C-
68 – 69.9%	D+
62.1 – 67.9%	D
60 – 62%	D-
59.9% and below	F

**Writing Requirement:** The University Writing Requirement will be satisfied upon completion of course assignments and the term paper.

**Students with Disabilities:**

Students with disabilities who require accommodation must be approved by the Office of Disabled Student Services (DSS). Please contact this office as soon as possible and should meet with the instructor during office hours (or at some other mutually agreeable time). The DSS office is located in Craven hall 5205. Their telephone number is (760) 750-4905 or TTY (760) 750-4909.

**Academic Honesty:** All students are expected to maintain academic honesty. This is especially true with regards to the completion of assignments and the term paper. **All submitted work must be your own and must be written in your own words.**

All students should be familiar with the university policies and procedures concerning academic honesty as detailed in the university catalog. An online version of these policies and procedures can also be found at:

[http://lynx.csusm.edu/policies/procedure\\_online.asp?ID=187](http://lynx.csusm.edu/policies/procedure_online.asp?ID=187)

Cheating, plagiarism, and other forms of academic dishonesty will not be tolerated. If you are caught cheating on an exam you will receive a grade of zero. All cases of academic dishonesty will be reported to the dean of students for appropriate action.

#### **Use of Plagiarism Detection Software:**

Where appropriate the instructor will use software (TURNITIN) for the detection of plagiarism.

Plagiarized work will not be graded (see above).

#### **Classroom Behavior and Student Code of Conduct:**

Students are expected to respect and follow standards of student conduct while in class and on the campus. As your instructor, I have the following expectations concerning your behavior in this class:

1. Promote a courteous learning atmosphere by exhibiting mutual respect and consideration of the feelings, ideas, and contributions of others.
2. Practice consideration for others by maintaining a clean and orderly classroom.
3. Recognize everyone's opportunity to contribute information in a relevant and meaningful manner by not monopolizing discussions, interrupting, interjecting irrelevant, illogical or inappropriate questions or comments.
4. Do not dominate class discussion--give others a chance to contribute!
5. If you must eat in class do so discreetly.

#### **HOW TO STUDY CHEMISTRY IN ORDER TO EARN A GRADE OF A, B, OR C.**

1. **Take good lecture notes.** You are responsible for everything that I write or project on the board (except videos). Make use of the PDF files of my slides (see above) to reduce the amount of writing you have to do in class.
2. Make flash cards of definitions, concepts, reactions, structures, and nomenclature that are covered in lecture notes.
3. Use your lecture notes/flash cards as a guide to your **reading in the textbook**. Read the relevant chapter (or chapter section) before coming to the lecture and after attending the lecture (yes, twice).
4. **Solve the homework problems.** Some of the answers are in the back of the textbook. One of the best ways of learning is to find a study partner or to form a study group and work on the problems together. Doing the homework problems is how you develop the analytical/critical thinking skills to do well on exams.
5. **Attend class.**
6. **If you have questions, ask.** Make use of the instructor's office hours.