

**FALL 2009**  
**COURSE SYLLABUS**  
**BIO 3522-BIOCHEMISTRY LABORATORY**

**LABORATORY SCHEDULE AND INSTRUCTORS**

SEC	INSTRUCTOR	LAB TIME	PHONE #	EMAIL	OFFICE HRS AND LOCATION
001	MADHULIKA JUELLI	T 7:30 – 10:30 AM			
002	ISAAC PENA	T 11:30 – 2:30 PM			
003	RYAN WHITE	T 3:00 – 6:00 PM			
004	SHAKAR JAIKISHAN EV	W 7:30 -10:30 AM			
005	AMIKSHA SHAH	W 11:30- 2:30 PM			
006	RESHMA MEREDIA	R 7:30 – 10:30 AM			
007	SHAKAR JAIKISHAN EV	R 11:30 – 2:30 PM			
008	ISAAC PENA	R 3:00 – 6:00 PM			
009	RAHEEL VEERANI	F 7:30 – 10:30 AM			
010	RYAN WHITE	F 11:30 – 2:30 PM			
011	RESHMA MEREDIA	F 3:00 – 6:00 PM			
012	AMIKSHA SHAH	W 3:00 – 6:00 PM			
901	EMMANUEL AKWAR	W 7:30- 10:30 PM			
902	HECTOR E. HERNANDEZ	R 7:30 – 10:30 PM			
903	EMMANUEL AKWAR	F 11: 30 – 2:30 PM			

**WebPages:** <http://webct.utsa.edu>

**COORDINATOR and LECTURE INSTRUCTOR:**

Dr. Pramod Kumar Office: SB 2.03.14

Email: [pramod.kumar@utsa.edu](mailto:pramod.kumar@utsa.edu)

Phone #: 458-5497

**LABORATORY/CLASS ROOM:** SB 2.01.42

**TEXTBOOK:** 1) WebCT Lab Manual 2) Suggested Textbook: any standard biochemistry Textbook

**COURSE OBJECTIVE:** The objective of this course is to provide you with a basic understanding of biochemical techniques, including buffer preparation, electrophoresis of amino acids, chromatography, protein fractionation, gel electrophoresis and western blotting and enzyme kinetics. Concurrent enrollment in BIO 3513 is recommended.

**GRADING POLICY:**

**Grades to be allocated**

<b>A = 90 or more</b> <b>B = 80 – 89</b> <b>C = 70 – 79</b> <b>D = 60 – 69</b> <b>F = less than 60</b>	Pre Lab Report and daily lab assignment	15%
	Mid Term	25%
	Finals	25%
	Individual Reports	10%
	Homework	15%
	Presentation	10%
	<b>Total</b>	<b>100%</b>

**EXAMINATION SCHEDULE:** Please see course outline.

**CLASSROOM BEHAVIOR EXPECTATION-**Students are expected to assist in maintaining a classroom environment that is conducive to learning. To assure all students have the opportunity to gain from time spent in class, students are prohibited from engaging in any form of distraction. Inappropriate behavior in the classroom shall result, minimally, in a request to leave class.

Make-up examinations are given only under certain extenuating circumstances and are generally difficult than the regularly scheduled exams. Please see policy details.

**BIO 3522-BIOCHEMISTRY LABORATORY  
COURSE OUTLINE**

<b>DATE Year 2009</b>	<b>EXPERIMENT</b>	<b>Lab Exercise</b>	<b>NOTES</b>
<b>WK 1:</b> 8/26 – 8/28	Check-in		
<b>WK 2:</b> 9/1 – 9/4	Introduction, Course policies, Safety contracts, pipetting and calculations	1	Syllabus H/O
<b>WK 3:</b> 9/8 – 9/11	Protein Determination*	2	
<b>WK 4:</b> 9/15 – 9/18	Preparing a buffer: Measurement of pH	3	<b>Homework 1</b>
<b>WK 5:</b> 9/22 – 9/25	Isolation and fractionation of albumin*ψ	5	
<b>WK 6:</b> 9/29 – 10/2	Determination of molecular weight of a protein by gel filtration*	6	<b>Homework 1 Due</b>
<b>WK 7:</b> 10/6 – 10/9	Electrophoretic analysis of an unknown amino acid mixture	7	
<b>WK 8:</b> 10/13 – 10/16	Polyacrylamide gel electrophoresis (SDS-PAGE)* <b>-MIDTERM REVIEW</b>	8	
<b>SAT OCT 17, 2009</b>	<b>COMMON MIDTERM EXAM</b>	10 am – 12:15 pm	(Ch 1 - 7)
<b>WK 9:</b> 10/19-10/22	Western blotting- detection of proteins on blot transfer matrix	9	
<b>10/29/2008</b>	<b>Last day to drop a course for grade “W”</b>		
<b>WK 10:</b> 10/27-10/30	Enzyme kinetics-Egg White Lysozyme*	10	<b>Homework 2</b>
<b>WK 11:</b> 11/3 – 11/6	Kinetics of enzyme inhibitors-Wheat Germ Acid <i>phosphatase</i>	11	<b>Homework 2 Due</b>
<b>WK 12:</b> 11/10 - 11/13	Enzymatic Determination of Total Cholesterol in Serum <b>-Group Presentation</b>	12	
<b>WK 13:</b> 11/17-11/20	<b>-Final Exam (in Lab) Review</b>		
<b>SAT NOV 21, 2009</b>	<b>COMMON FINAL EXAM</b>		

\*Lab exercises for individual lab report write-up.

ψThis lab experiment requires a student to complete the experiment in two days. Consult with your lab instructor before you sign up for Lab Report write up.

**BIO 3520-Fall 2009: Lab Lecture Schedule**

<b>EXPERIMENT</b>	<b>ATTEND BACKGROUND LECTURE</b>	<b>SUBMIT PRELAB OUTLINE</b>	<b>PERFORM LAB EXPERIMENT</b>
<b>Week 1:</b> Check-In	FRI, AUG 28	n/a	n/a
<b>Week 2:</b> PRACTICING PIPETTING AND CALCULATIONS	IN LAB TEACHING	n/a	SEP 2 - 5
<b>Week 3:</b> PROTEIN DETERMINATION* (Monday's sections- review Blackboard posted notes for this lab experiment)	FRIDAY, SEP 4 LABORDAY, MON SEP 7	SEP 8 - 11	SEP 8 - 11
<b>Week 4:</b> PREPARING A BUFFER: pH MEASUREMENT	FRIDAY, SEP 11 MONDAY, SEP 14	SEP 15 - 18	SEP 15 - 18
<b>Week 5:</b> ISOLATION AND FRACTIONATION OF ALBUMIN	FRIDAY, SEP 18 MONDAY, SEP 21	SEP 22 - 25	SEP 22 - 25
<b>Week 6:</b> DETERMINATION OF MOLECULAR WEIGHT OF A PROTEIN BY GEL FILTRATION*	FRIDAY, SEP 25 MONDAY, SEP 28	SEP 29 – OCT 2	SEP 29 – OCT 2
<b>Week 7:</b> ELECTROPHORETIC ANALYSIS OF AN UNKNOWN AMINO ACID MIXTURE	FRIDAY, OCT 2 MONDAY, OCT 5	OCT 6 - 9	OCT 6 - 9
<b>Week 8:</b> MIDTERM REVIEW	FRIDAY, OCT 9 MONDAY, OCT 12	OCT 13 - 16	OCT 13 - 16
<b>Week 9:</b> POLYACRYLAMIDE GEL ELECTROPHORESIS (SDS-PAGE)	FRIDAY, OCT 16 MONDAY, OCT 19	OCT 20 - 23	OCT 20 - 23
<b>Week 10:</b> WESTERN BLOTTING-DETECTION OF PROTEIN ON A BLOT TRANSFER MATRIX	FRIDAY, OCT 23 MONDAY, OCT 26	OCT 27 - 30	OCT 27 - 30
<b>Week 11:</b> ENZYME KINETICS-EGG WHITE LYSOZYME	FRIDAY, OCT 30 MONDAY, NOV 2	NOV 3 - 6	NOV 3 - 6
<b>Week 12:</b> KINETICS OF ENZYME INHIBITORS-Wheat germ <i>acid phosphatase</i>	FRIDAY, NOV 6 MONDAY, NOV 9	NOV 10 - 13	NOV 10 - 13
<b>Week 13:</b> ENZYMATIC DETERMINATION OF CHOLESTEROL DETERMINATION, Exam Review	FRIDAY, NOV 13 MONDAY, NOV 16	NOV 17 - 20	NOV 17 - 20
<b>Week 14:</b> FINAL EXAM REVIEW	FRIDAY, NOV 20		

## **BIOCHEMISTRY LABORATORY**

### **Preparation for Each Experiment**

In the preparation of each experiment, you must follow these guidelines:

1. Read the assigned lab
2. Attend the background lecture for each experiment (see lab lecture schedule)
3. Prepare a pre-lab write-up illustrating the steps involved in doing experiment. The pre-lab outline should demonstrate that you understand how the experiment should be carried out and list any practical questions you may have. The pre-lab outline must be submitted to your instructor at the beginning of each lab period.
4. Answer pre-lab associated questions.

### **Missed Lecture/Lab**

If you miss a lab lecture, you will receive a zero grade for that weekly lab experiment. You may make up a lab by attending one of the other lab sections (only during the same week) after coordinating such attendance with your instructor.

**Lab Reports:** 1) Weekly laboratory reports will consist of “worksheets” included with each experiment. 2) Only one formal report (marked with “\*” in the syllabus outline) is required and should follow the general format provided in this handout and instructions provided by the instructor. All laboratory worksheets and formal reports are due at the beginning of the laboratory on the date indicated. A deduction of 10 points per day will be subtracted from reports turned in late up to 4 days (including weekend and holidays). After that zero grade will be assigned.

### **Midterm and Final exams**

Each of these exams will be comprehensive and cover material up to the time of the exam. Each is based on the lab manual, experiments, and all material presented or assigned during class. See your instructor to coordinate a make-up midterm if you cannot be present for the exam for excusable reasons.

### **Postponed or missed Final exam**

To postpone the final exam due to dire circumstances such as personal illness or family emergency, you must follow the procedures outlined in the UTSA Undergraduate Catalog. You must receive

permission from the instructor for Postponement at least 24 hours before the beginning of the final exam.

If you follow these procedures, you will receive a grade of "IN" and will have an opportunity to take the final later in consultation with your instructor.

Incomplete-The grade “IN” is given by an instructor to indicate that some part of the work of a student in a course has, for good reason, not been completed, while the rest of the student’s work in the course was satisfactorily completed. The Incomplete allows a student to complete the course without repeating it. A grade of Incomplete may not be assigned when a definite grade can be given for the work done. **The student must have been in attendance at least three-fourths of the semester to receive a grade of “IN.”** Whenever a grade of Incomplete is assigned, the instructor is required to submit requirements for removal of the Incomplete.

During the regular grading period this is done electronically. After the grade submission deadline, a Requirement for Removal of Incomplete form must be submitted to the Dean’s office. The Dean’s office will then submit the form to the Office of the Registrar. In undergraduate courses, incomplete work must be made up no later than the end of the final examination period one year from the semester the incomplete was received and before the student’s graduation. If the work is not completed within this time, the “IN” is automatically changed to a grade of “F”.

### **Attendance and Class participation**

Attendance and full participation in every lab meeting is expected. If you have two absences on or before the last date for dropping the course with a 'W', and have not contacted your instructor about these absences, he/she may decide to drop you from the course for non-attendance. It remains your responsibility to withdraw before the drop date if that is your intention.

You will be counted as excessively absent if you miss more than 25% of the course any times in the semester including the day of the final exam. In such a case your instructor will recommend to the Dean of the College that you receive an "F" for the course for

excessive absences.

### **Wastes**

Place wastes in their proper containers. Broken glassware goes in the container marked for such. Liquids go down the sink, after approval from your instructor, with plenty of water. Other waste materials go into the general trashcan.

### **Clean-Up Procedure**

At the completion of your experiment, you are required to clean up your work area and a portion of the general work area. Be sure that:

- I. assigned areas are wiped down with a damp

paper towel.

- II. electrical equipment has been turned off, unplugged, and its cords coiled.
- III. soiled equipment, such as glassware, instrument has been cleaned or put in the proper place.
- IV. chairs are tucked in.
- V. your entire half of the lab bench is toweled down.

After your team has been checked out, you may leave. **DO NOT LEAVE BEFORE THEN, UNLESS YOU HAVE PERMISSION FROM THE INSTRUCTOR.**

## **Lab Report Write up**

Lab reports are an essential part of this course and represent the major mechanism for grading your work!

Only ONE formal lab report is required for this course and should be turned in on the schedule provided. Lab reports must be prepared on a computer using a word processor (Microsoft Word etc.). All graphs must be drawn on a computer using a graphing program such as a spreadsheet program (*i.e.*, Excel etc.) or Sigma Plot. Be sure that all graphs are properly labeled and represent the data well.

The main purpose of the lab report is to show me that you understand what you did in the lab and that you know how to do the calculations associated with the experiment, which is presented in the report!

If many of the same type of calculations are being done, it is OK to show just one example of such a calculation. Be sure that the lab report includes all aspects of the experiment, some of which may be changed from what is described in the text. I also want you to demonstrate in the lab report that you thought about the experiment and have made an intelligent assessment of your results. Since some of your results will probably come out differently than you think they should, you should report the results you find and then explain what you think might have caused them

to be in error etc. But try to avoid constantly making excuses why you have no logical way to know if you did something wrong or not.

**LONG LAB REPORTS ARE NOT NECESSARY AND SHOULD BE AVOIDED!**

### **LAB REPORT STYLE:**

- The style of your lab report is important since it sets a framework for your presentation.
- The lab report must have the following sections: (Your instructor will give you review for each assigned lab report at the end of lab period. Write your group number assigned to your group in the corner of first page.)

### **Style vs. Substance:**

- A fixed format or style is required for the Lab Report.
- Introduction, Methods, Results, Discussion and summary
- Similar to style used in writing a scientific manuscript for a journal

**While style is necessary, substance is what really**

## counts

- The five part style of the Lab Report is required but is only the framework for a top lab report
- Substance is what gets the Lab Report the higher grade and Most Points.
- Show me in the Lab Report:
  - what you intended to do (Introduction),
  - how you did it (Methods),
  - what you found out (Results), and
  - what you think it means (Discussion)
- A final Summary is a good finishing touch to show that you can say it all in a few short words (do not include references in this section)

**TITLE:** can be obtained from syllabus.

### I. **Introduction** (What you intended to do?) 15 points

- Why are you doing the experiment?
- What is unique about the Experiment?
- Briefly explain principles underlying the Experiment.
- Present equations and chemical structures for this Experiment, if any
- Are there any special things about this experiment that help you to understand it
- What do biochemists with the methods studies in this experiment
- In Summary: INTRODUCTION should be short, to the point and well illustrated with equations/structures (if any).

### II. **Methods** (How you did the Experiment?) 10 points

- Guidelines you followed in doing the Experiment (text citation and pages *used/exp* # etc)
- What you did differently than the text description (special instructions from your instructor etc)
- Identify anything you did that was different than what was expected (mistakes in your lab work)
- Summary: METHODS should be short with only enough detail to make it clear what

protocols you followed -just enough to allow someone else to reproduce your work from the same written sources.

### III. **Results** (What you found out in the lab and analysis of the data using Tables and figures) 25 points

- Present your data here -every bit of it -even if you think it is not correct
- Think about the layout of the results to best present the data
- It's OK to mix raw data and analysis -like the data for a graph and then the graph illustrations (graphs and tables) can be separated from the main text -just be sure to refer to them in the text part
- Graphs should be computer drawn -be sure to label graphs well and identify different data sets with different symbols
- Tables need to have clear column heading and proper units attached to them, but can be done by hand if your word processor does not support tables very well.
- State which part of the experiment is performed by you
- Recreate graphs and tables. Do not use templates posted on blackboard.
- Summary: Don't interpret the Results, leave that to the Discussion. Be sure to cover all aspects of the Experiment, even those done by your partners. Do identify special problems you had, *i.e.*, mention places where you known you screwed up.

### IV. **Discussion** (What you think it means) 30 points

- Start discussion with a statement of what were you trying to do in the experiment and review the results, step by step by stating what you found and what that means to the overall experiment. Use result outcomes to describe steps.
- Avoid catch-all excuses such as 'we probably made some pipetting errors'-but do discuss the impact of known mistakes-'like it appears that we added the wrong amounts of reagent

X to the reaction, thus all the absorbance for the standard curve were in error.'

- How does the experiment fit in your contextual understanding of the biochemical usefulness, *i.e.*, why would a biochemist do this experiment and what it mean to him/her in understanding the properties of a biochemical (such as protein or enzyme) and the function of the biochemical in the organisms from which it was isolated. This way your discussion coordinates with introduction.

**V. Summary and Conclusion** (Say it all in few words) 10 points

- This is a good way to wrap up your Lab Report and bring to an end.
- Summary writing is a difficult task.
- A good summary (include calculated end results from your experiment) represents that you have understanding what happened in the experiment.
- A good conclusion shows you that what objective of the experiment was and how you achieved it.

**VI. Bibliography/ References** 5 points

- Literature cited in the lab report should be listed here.
- References should be complete, *i.e.*, author (s), title, volume, page numbers, and year of publication.
- Each report should contain at least 5 references.
- Only one internet reference is allowed to include in bibliography.

**Note:** The actual report write-up weighs 95 points and 5 points for neatness and following format.

**General Hints on writing-**

- Capitalize and abbreviate correctly.
- Remove all dangling phrases.
- Do not start a sentence with a number in numerical form. If you want to start a sentence with a number, write in word(s). If you want to emphasize the number, write the word then put the figure in parentheses, *e.g.* Eight (8) tubes.
- A decimal number should always have a figure before the decimal point, *e.g.*, 0.6 (not as .6),
- Write most information in past tense except introduction.
- Use present tense only if you are generalizing or stating facts.
- If in doubt about the format, consult *Journal of Biochemistry*, *Journal of Biological Chemistry* or *Analytical Biochemistry* in the library.
- In notebooks, reports, or in speaking, use units that do not require exponents unless there is a good reason for doing otherwise, *e.g.*, write or say 5  $\mu$ moles rather than  $5 \times 10^{-6}$  moles.
- Important-whenver a concentration term is used anywhere, including tables and figures, always identify what solution the concentration refers to, *e.g.*, do not write "6.0 mg of protein/ml", but rather "6.0 mg of protein/ml of original protein solution" so both you and any other reader know it does not refer to a dilution of the original enzyme solution or to some other solution, but to the original protein solution.