

# CHEMISTRY 6B - Introduction to Organic and Biological Chemistry Fall, 2009

Instructor: Linda M. Roberts, PhD

## Contact information

Office: 548C Sequoia Hall

Phone: 278-3892

Email: robertslm@csus.edu

Webpage: [www.csus.edu/indiv/r/robertsl](http://www.csus.edu/indiv/r/robertsl)

Office hours: TRF 11-12 pm (Tuesday office hour will be held in Help Office, Sequoia 502. Office hours will be cancelled on furlough days as announced in the schedule below.)

## Lecture and Lab Meeting times and locations

		<u>Instructor</u>
Lecture (sec 1)	1-1:50 p.m., MWF, Sequoia Hall, Rm 301	Linda Roberts
Lab (sec 2,3)	2-5:30 p.m., M, Sequoia Hall, Rm 428	Tom Savage
Lab (sec 4,5)	9-12:30 p.m., W, Sequoia Hall, Rm 428	Jahansooz Toofan

**Required textbooks:** **Lecture** - *Introduction to General, Organic and Biochemistry*, 9<sup>th</sup> edition by Hein et al. **Lab** - *General, Organic, and Biochemistry in the Laboratory*, 9th edition, by Hein, Peisen, and Ritchey.

**Course description:** Introduction to the structure and properties of the major classes of organic compounds; introduction to nomenclature of organic compounds and to the fundamental concepts of reaction mechanisms and stereochemistry; the chemistry and metabolism of carbohydrates, lipids, and proteins; the latter will include enzymes.

**This course will not fulfill the requirement for more advanced study in biology or chemistry and cannot be counted toward a major or minor in biology or chemistry.**

**Course prerequisite:** Completion of Chemistry 1A or 6A with a grade of C- or better. Students with a strong high school chemistry background may take a challenge exam to fulfill the prerequisite. **All students must show proof of prerequisite completion by the end of the first week of class.** *Please note that second repeaters will be disenrolled if there is a waiting list.*

**Learning objectives:** This is a survey course covering a wide range of concepts and material. The overall goal of the course is for you to become familiar and **comfortable** with the structures, properties, reactivity, and health-related applications of organic and biological molecules. In particular, this course will enable you to:

- Recognize and name compounds from various classes of organic and biological compounds.
- Understand the structure and properties of functional groups.
- Know reactions of functional groups, particularly as they apply to biological molecules.
- Understand stereochemistry of organic and biological molecules.
- Understand the structures of the major groups of biological molecules and how these relate to biological function.
- Apply your knowledge of biological molecules to nutrition, metabolism, and disease states.

**GE:** Chemistry 6B fulfills an area B5 writing requirement through the use of written laboratory reports, therefore any written material submitted for grading will be evaluated for clarity, grammar, and spelling, in addition to its content. Please plan accordingly when submitting lab reports. Students who turn in sloppy or poorly written reports will lose points.

**Furlough days.** Due to the economic crisis occurring in the state of California, faculty are required this semester to take nine furlough days during which they are not allowed to work. Due to furloughs, three lectures (Sept. 18, Oct. 16, Nov. 25) will be replaced with worksheets. Furlough day worksheets will help you learn the material that will not be covered due to my absence on furlough days. These will not be graded but must be completed (with reasonable answers). **Failure to fully complete all three worksheets will result in a grade of F for the entire course.** Late worksheets will not be accepted.

**Assignments and grading:**

Hour exams (2)	140 points each	280
One-minute quizzes	2 pts ea., totaled as % grade	100
Final exam (cumulative)	150	150
Homework	100	100
Lab exams (2)	75 points each	150
Lab exercises (11)	20 points each	220
Furlough day worksheets (3)	0 points each	<u>0</u>
		1000

90% and above = A range  
80% and above = B range  
70% and above = C range  
60% and above = D range  
<60% = F

**Class policies:**

Add-drop dates and policies: see current university calendar

Cheating: Cheating of any kind will not be tolerated. Any acts of cheating will result in a grade of zero and submission of your name to the Office of Student Affairs. Campus policies on academic honesty can be found at this website:

<http://www.csus.edu/umannual>. Click on "Find a Policy". Then click on "Academic Honesty, Policy and Procedures".

Attendance: Attendance in lecture is not required but is strongly recommended.

Remember that one-minute quizzes given at the beginning of most lectures cannot be made up. Attendance is required for all laboratories (see laboratory syllabus for more information).

Late entry: Late entry to class or lab will not be permitted after the first week of class without a valid, verifiable excuse. If you come to lab late, you will have to make it up in another section, pending instructor approval. Repeated infractions in either lecture or lab will result in disenrollment from the course.

Class etiquette: Cell phones should be turned off. The ONLY exception to this is a family related medical situation. Do NOT answer phones or pages in class. Repeated infractions will result in disenrollment from the course. Although class participation is strongly encouraged, please refrain from private conversations.

**Exams:** The exams will test material and concepts covered in lecture and in the assigned homework. The final exam is cumulative. The format of each exam will be a mixture of multiple choice, T/F, etc, and short problems or essays. Exams will require Scantron form 882-E. You will be asked to present a photo ID on each exam day.

Make-up exams: If you miss an exam, you must provide a medical or other very compelling reason (generally, car problems won't cut it - make sure you have good transportation the day of the exam). The make-up exam will be significantly harder, so it is best not to miss an exam. THE FINAL EXAM MUST BE TAKEN ON THE SCHEDULED DATE AT THE SCHEDULED TIME. There are NO EXCEPTIONS (except for valid medical excuses) so PUT THE DATE IN YOUR CALENDAR NOW!!!!

**One-minute quizzes:** Most lectures will start with a brief 1-2 minute quiz. A blue book is required for taking the quizzes. The purpose of the one-minute quiz is to compel you to study new material ahead of lecture. This will greatly enhance your ability to understand the new material as it is presented in lecture and will allow more time for in-

class problem-solving. I will be piloting the use of clickers in place of blue books 3 or 4 times during the semester. The clickers will be provided free of charge on those days.

**Homework:** Homework assignments will be given in class. Homework is due at the assigned time and cannot be made up. All assigned problems must be present to receive the points for the assignment. If one or more problems is missing, you will receive a zero for that assignment.

**Laboratory:** Laboratory policies are discussed in the laboratory syllabus.

### How to study for this class:

- You will need to spend a minimum of nine hours per week studying for the lecture portion of the class!!
- Read the text. In particular, read the material to be covered in class before it is presented.
- Do all of the assigned homework. Then do problems that were not assigned. Homework is the most important tool for helping you grasp the material.
- Use the end of chapter questions to practice for exams.
- Review **all** of your lecture notes three time a week.
- When reviewing your lecture notes, make a notation of anything you don't understand. Then come and see me about it.
- Come and see me whenever you don't understand something.

**I want you to succeed in this course.** I will make myself as available to you as reasonably possible. If you can't make my office hours, I will try to schedule an appointment outside of those times. I will also entertain questions by email, provided these do not become excessive. It is very important that you talk to me as soon as a problem arises. The class will move very quickly and it is easy to fall irretrievably far behind.

## TENTATIVE LECTURE SCHEDULE

**Note:** the lecture schedule shown below is a guide and not written in stone. I frequently take more time on a topic if it seems to be needed. In addition, I reserve the right to discard material listed below or to add new material. I will always give you plenty of notice of changes to lecture material and how it may impact homework or exams.

Week	Date	Chapter	Topic	Lab Expt.
1	8/31	11	Review of atomic structure and bonding	Check-in
	9/2	14,15	Review of solubility, acids and bases	
	9/4	19	Alkanes	

2	9/7		Labor Day - no class meeting	Exer. 18. <i>NOTE: take-home lab</i>
	9/9	19	Alkanes	
	9/11	19	Alkanes	
3	9/14	20	Alkenes (note: we will omit alkynes)	Exer. 25
	9/16	20	Alkenes	
	9/18	22	Alcohols <i>Furlough day. Worksheet will be handed out on 9/16 and will be due on 9/21.</i>	
4	9/21	22	Alcohols	Exp. 28
	9/23	22	Alcohols	
	9/25	23	Aldehydes and ketones	
5	9/28	23	Aldehydes and ketones	Exp. 29
	9/30	24	Carboxylic acids	
	10/2	24	Carboxylic acids	
6	10/5	24	Esters	Exp. 31
	10/7	<b>EXAM 1</b>	<b>Chapters 19, 20, 22-24</b>	
	10/9	25	Amines	
7	10/12	25	Amines, amides	Exp. 32
	10/14	26	Stereochemistry	
	10/16	27	Carbohydrates <i>Furlough day. Worksheet will be handed out on 10/14 and will be due on 10/19.</i>	
8	10/19	27	Carbohydrates	Exer. 26
	10/21	27	Carbohydrates	
	10/23	28	Lipids	
9	10/26	28	Lipids	<b>LAB EXAM 1</b>
	10/28	28	Biological membranes	
	10/30	29	Amino acids and peptides	
10	11/2	29	Proteins	Expt. 41
	11/4	29	Proteins	
	11/6	30	Enzymes	
11	11/9	31	Nucleic acids	DNA isolation (take-home lab)

	11/11		<b>Veteran's Day - no class meeting</b>	
	11/13	31	Nucleic acids	
12	11/16	<b>EXAM 2</b>	<b>Chapters 25-30</b>	Expt. 40
	11/18	32	Nutrition	
	11/20	33	Bioenergetics	
13	11/23	33	Metabolism overview	No labs this week
	11/25	34	Glycolysis <i>Furlough day. Worksheet will be handed out on 11/23 and will be due on 11/30.</i>	
	11/27		<b>Thanksgiving - no class meeting</b>	
14	11/30	34	Gluconeogenesis and glycogen metabolism	Disorders of metabolism
	12/2	34	Citric acid cycle	
	12/4	34	Electron transport and oxidative phosphorylation	
15	12/7		Fatty acid oxidation	<b>LAB EXAM 2 CUMULATIVE</b>
	12/9		Disorders of metabolism, diabetes	
	12/11		Catch up	
16	12/14		<b>CUMULATIVE FINAL EXAM 12:45-2:45</b>	

# CHEMISTRY 6B Lab

## Fall, 2009

### Meeting times and locations:

Lab (sec 2,3) 2-5:30 p.m., M, Sequoia Hall, Rm 428  
Lab (sec 4,5) 9-12:30 p.m., W, Sequoia Hall, Rm 428

### Instructor

Tom Savage  
Jahansooz Toofan

### Lab instructor contact info:

Tom Savage, PhD: Sequoia 510, 278-3918, tjsavage@csus.edu

Jahansooz Toofan, PhD: Sequoia 530, 278-7152, jtoofan@csus.edu

**Required textbook:** General, Organic, and Biochemistry in the Laboratory, 9th edition, by Hein, Peisen, and Ritchey.

**Attendance:** Attendance is required for **all** labs in order to pass the course. If an absence is unavoidable, a verifiable excuse will be accepted, but you will need to make up the lab either that same week in another lab section (with the lab instructor's permission) or the following week. Labs cannot be made up at any other time. If you make up a lab in a section other than your own, **you must have that lab instructor's signature on your pre and post-labs.** You are limited to two make-up labs for the semester.

**Tardiness:** Tardiness will not be tolerated. If you have a verifiable excuse, you may be asked to take the pre-lab quiz upon entry to the lab or, depending on the degree of tardiness, you may be asked to make up the lab in another section.

**Lab assignments:** Each lab consists of a pre-lab and a post-lab.

#### Pre-lab (4 pts)

The pre-lab will follow the same format each week. At the start of the lab period, you will be given 5-10 minutes to complete a quiz relating to the safety and procedure for that day's lab. The quiz format will be the same each week as in the example shown below:

#### ***Pre-lab quiz #1.***

***A. List two specific safety issues (besides goggles and food and drink consumption) associated with today's lab. (2 pts)***

***Answer:***

- a. Avoid skin contact with concentrated sulfuric acid***
- b. Ethanol is flammable - avoid exposing it to flames***

B. Briefly describe the procedure for today's lab, giving at least one specific, detailed example in the procedure. (2 pts)

*Answer:*

*In today's lab, we will be analyzing the properties of lipids. We will do this by conducting a series of tests on different kinds of lipids. We will place a small amount of each lipid in a tube and add a reagent to it. For example, we will set up tubes containing vegetable oil, vegetable shortening, hexene, or cyclohexene. We will add bromine to each tube to test for the presence of a double bond. The orange bromine color will turn clear if a double bond is present in the lipid. Since this lab involves a lot of organic solvents, we will need to be careful about disposing of materials when we are done.*

Post-lab (16 points)

The post-lab consists of the report pages at the end of the experiment and is due at the end of that same lab period. Post-labs must be filled out in ink. Late reports will not be accepted.

**Exams:** There will be two lab exams. These exams will cover both the background and the experimental material from each laboratory. The second lab exam is cumulative.

**Grading:** Each experiment or exercise is worth 20 points. Exercises do not have a pre-lab; the 20 points comes from the completed exercise. For experiments, the pre-lab is worth 4 points, and the post-lab is worth 16 points. Each lab exam is worth 75 points.

**Safety requirements:** Short shorts or skirts, and bare midriffs are not allowed in the laboratory. Feet must be fully covered. Food and drink are not allowed in the laboratory. IN particular, do NOT place food or drink items on benchtops, which may contain spilled chemicals from a previous lab section. Approved safety goggles must be worn at all times. Hazardous materials must be disposed of according to your instructor's directions. You are required to know the location of fire blankets, fire extinguishers, and eye washes. Repeated safety infractions will result in dismissal from the course. Safety policies will be reviewed by your lab instructor in the first lab meeting.

## Laboratory Schedule

<u>Week</u>	<u>Experiment</u>	<u>Lecture topic</u>
1 - 8/31	Check-in, review of safety policies	Review material, alkanes
2 - 9/7	<i>Exercise # 18, Hydrocarbons. <u>To be completed at home</u> and turned in during the next lab period. No pre-lab.</i>	Alkanes
3 - 9/14	<i>Exercise # 25, Structural isomers. No pre-lab.</i>	Alkenes, alcohols
4 - 9/21	<i>Expt # 28, Hydrocarbons</i>	Alcohols, aldehydes, ketones
5 - 9/28	<i>Expt # 29, Alcohols, aldehydes, etc.</i>	Acids and esters
6 - 10/5	<i>Expt # 31, Synthesis of aspirin</i>	Amines and amides
7 - 10/12	<i>Expt # 32, Amines and amides, finish # 31</i>	Stereoisomers
8 - 10/19	<i>Exercise # 26, Stereoisomers. No pre-lab.</i>	Carbohydrates, lipids
9 - 10/26	<b>LAB EXAM # 1</b> (through expt. 32)	Lipids and membranes
10 - 11/2	<i>Expt # 41, Lipids (modified); Fat content in foods (hand-out)</i>	Amino acids, proteins and enzymes
11 - 11/9	DNA isolation (hand-out). <u>This lab will be conducted at home</u> and will be due at the next lab meeting. THE PRE-LAB FOR THIS LAB WILL BE TURNED IN AT THE MONDAY LECTURE!	Nucleic acids
12 - 11/16	<i>Expt # 40, Enzyme catalysis</i>	Nutrition, bioenergetics
13 - 11/23	No labs - Thanksgiving week	Carbohydrate metabolism
14 - 11/30	Disorders of metabolism: type II diabetes (hand-out)	Carbohydrate metabolism
15 - 12/7	<b>LAB EXAM # 2</b> and check-out	Lipid metabolism, metabolic disorders