Chemistry 31, Organic Chemistry I

Fall Quarter, 2010 MWF, 9:15 – 10:20 AM, Daly Science 206

Instructor Lecture: Amelia A. Fuller, Ph.D. email: aafuller@scu.edu phone: 554-4316
Laboratory: Drs. Dafforn, Fuller, Lee, Ruhland, Samuels, and Tichy

Office hours Alumni Science 156. Wed. 10:30 AM–12:30 PM, Thurs. 9–10 AM. Other times by appointment.

Texts and other materials

Lecture:

1. Recommended textbook: *Organic Chemistry* by Francis A. Carey and Robert M. Guiliano, 8th edition.

The textbook is a valuable reference to support material covered in lecture, but purchasing it is optional. I will not assign required readings or problems from the textbook or test on concepts in the text but not covered in lecture. Textbooks are available at the book store. Alternatively, you may order an e-book from either www.coursesmart.com or www.textbooks.vitalsource.com. If you purchase the textbook from CourseSmart, you will have online access to the text for *one year only*. The VitalSource version of the text can be downloaded onto up to two computers. The VitalSource version of the text will then be yours "forever." The VitalSource version also has added capabilities not available in CourseSmart, including links between sections and chapters of the book and to a glossary for important terms included in the text.

2. *Class packet*. A collection of handouts, discussion templates, and problems for homework or in-class assignments. Bring this with you to lectures. Available online at the course Angel site (see below). Printed copies will be sold at Copy Craft, 341 Lafayette St.
3. *Problems packet.* A collection of organic chemistry problems from which homework assignments will be made. Available online at the course Angel site (see below). Printed copies will be sold at Copy Craft, 341 Lafayette St.
4. Molecular modeling kits (optional). Available from Chem Club members during the first few weeks of classes.

Laboratory (all required materials):

1. Textbook: *Experimental Organic Chemistry* by Gilbert and Martin, SCU custom edition.
2. Laboratory syllabus and handout packet. Available at the bookstore.
3. Bound laboratory notebook. Available at the bookstore.
4. Safety goggles. Available from Chem Club sales during the first week of classes.

Objectives This course will expand your understanding of fundamental principles in organic chemistry and their application to solving chemical problems. Additionally, you will apply the concepts from lecture in the laboratory setting. To do so, this course will meet the following learning objectives:

1. Communicating chemical information effectively. You will learn both the technical vocabulary used and the clear representation of chemical structures and reaction mechanisms.
2. Relating physical and structural properties of organic molecules with their reactivities. You will learn to identify and compare the molecular features that govern chemical reactivity.
3. Predicting the outcome of chemical reactions. You will learn to think critically applying central principles of organic chemistry to solve chemical problems in a rational manner.
4. Applying chemical principles in the laboratory. You will learn to execute independent experiments that supplement and complement the topics covered in lecture. You will become proficient in essential techniques for the reaction, isolation, purification, and identification of organic compounds, and the proper disposal of waste produced in generating them. You will also learn the proper use and maintenance of a laboratory notebook as a record of your experimental work.

Course content

The course begins with a review of some general chemistry topics including Lewis structures, molecular geometry, and atomic orbital hybridization. We will learn the basic types of organic functional groups, resonance, stereochemistry, and acid/base chemistry. We will apply our chemical background in these topics to the study of three classes of compounds: alkanes, alkyl halides, and alkenes. In the context of these three molecular classes, we will study the relationships between structures, physical properties, and reactivity. We will deepen our comprehension of reactivity by a careful, stepwise analysis of reaction mechanisms thus rationalizing observed reactivity with fundamental chemical principles.

Tools for study

Texts and Lectures: Your exposure to topics prior to the lecture will enhance your understanding of the new material to be introduced. I recommend that you review your notes from the previous class and scan the topics to be covered in class *before* the lecture. Additionally, taking a few minutes to review your lecture notes and highlight the key ideas covered *directly after class* has been shown to be a highly effective way to enhance concept comprehension.

Problem Assignments: Although problem sets will not be graded, you should expect to do **all** of the assigned problems from the text and other sources and to complete this work in a timely manner. Your success in this course and in other chemistry courses will largely be dependent on your ability to solve problems. Additionally, the problems I assign represent the types of problems that you may encounter on quizzes and exams throughout the quarter. If you struggle with assigned problems, please see me during office hours or by appointment.

Use of Problem Set Keys and Solutions Manuals: The best approach to working assigned problems is to use the problem set keys and solutions *only after* you have worked the problems a number of times with the help of your notes. Your ability to solve problems independently from solutions manuals will allow you to assess your own performance and progress most accurately. A useful strategy is to work in groups and grade one another's work, marking problems simply as right or wrong. With this information, you may correct wrong answers without being biased by what you see in the solution key. If you are stuck, ask for a hint to get you started. Review your notes, and apply basic chemical principles from there. An important part of the learning process is for you to identify errors in your critical thinking process as you solve problems. Correcting these errors will deepen your comprehension of the fundamental principles of organic chemistry and will expand your problem solving skills; these skills are essential to your continued success in chemistry.

Problem Sessions

Weekly problem-solving sessions will be led by former organic chemistry students. Attendance is optional. The time, day, and location for these sessions will be announced during the first week of class.

Course Evaluations

Course evaluations will be completed online. Anonymous, long-answer evaluations provide valuable feedback to improve the course from year to year. Forms will be distributed prior to the final exam for your completion. A brief mid-term survey will also be administered.

Academic Integrity

Giving or receiving unauthorized aid in any form can result in course failure. The SCU policy on academic integrity can be found at: www.scu.edu/academics/bulletins/undergraduate/Academic-Integrity.cfm. See me if clarification is needed.

Standards

Chemistry 31 is a prerequisite for Chemistry 32, Organic Chemistry II. In order to be eligible for enrollment in Chemistry 32, you must complete Chemistry 31 with a grade of C-minus or higher. If you do not meet this standard, it is your responsibility to withdraw from pre-enrollment or not to enroll in

Chemistry 32. If you enroll in a course for which you have not met the standard, you are subject to administrative withdrawal on the first day of class.

Disability accommodation

To request academic accommodations for a disability, students must contact Disabilities Resources located on the second floor of Benson. Phone numbers are (408)554-4111; TTY (408)554-5445. Students must register and provide documentation of a disability to Disabilities Resources prior to receiving academic accommodations.

Cell phones and laptops

Use of cell phones, laptop computers, or other electronic devices during class time is prohibited. Students who use cell phones during class will be dismissed from the classroom for the remainder of the lecture, and any assignments missed during that time will not be accepted for credit. ANY use of cell phones or other electronics (including calculators) during exams will be considered a breach of academic integrity.

ANGEL and email

All materials for this course including syllabi, class handouts, problem sets and solutions, practice exams, and practice exam keys will be placed on ANGEL. These can be located from http://angel.scu.edu and then navigating to locate the appropriate class page.

I will also frequently communicate with the class via email to distribute problem assignments, class announcements, hints, etc. You are expected to maintain an active GroupWise email account and check it regularly.

Grading Your grade will be based on your performance on the following. *All evaluations will be cumulative.*

All exams and quizzes will be given only during the scheduled times*. Speak to me directly if you have a conflict.*

Quizzes:	7 @ 5 points each

Quizzes will be given on Fridays at the beginning of class as noted on the schedule.

Exam I, 30 minutes (**Monday, October 11**):	1 @ 50 points
Exam II, 65 minutes (**Monday, November 8**):	1 @ 100 points
Final Exam (**December 8, 9:10 AM to 12:10 PM**):	1 @ 200 points

Laboratory: Your performance in the laboratory will have a small impact, but potentially significant bearing on your overall grade. Laboratory performance can be influential in increasing or decreasing your final mark for the course. Final grades will be based on a curve which reflects your performance relative to the average for the class. Unsuccessful completion of the laboratory work will result in course failure.

Class Schedule

Below is a schedule that estimates when we'll cover specific topics in class. Except for dates of quizzes and exams, this schedule is subject to some change as we move through the quarter. Again, please familiarize yourself with topics to be covered prior to the lecture on that material.

Week	Day	Date	Text chapters	Topics
1	M	Sept. 20	Introduction, 1	Introduction and class objectives, Lewis structures review
	W	Sept. 22	1.1-1.11	hybridization and molecular geometry
	F	Sept. 24	1.1-1.11 2.6, 2.20, 2.21	drawing organic molecules, bond polarity and electronegativity, *Quiz*
2	M	Sept. 27	1.1-1.11,	dipole moment, formal charge, resonance
	W	Sept. 29	1.8, 4.1,	resonance, functional groups
	F	Oct. 1st	13.1, 13.2, 13.20-13.22	IR spectroscopy, *Quiz*
3	M	Oct. 4	13.1, 13.2, 13.20-13.22	IR spectroscopy
	W	Oct. 6	2	Alkanes and cycloalkanes: nomenclatrure and physical properties
	F	Oct. 8	2	Alkanes and cycloalkanes: units of unsaturation, isomerism, *Quiz*
4	**M**	**Oct. 11**	***Exam I (30 minutes)***	
			13.14-13.15	Intro to ^{13}C spectroscopy
	W	Oct. 13	3.1-3.12	Conformational analysis of alkanes, cyclopentane
	F	Oct. 15	3.1-3.12	Conformational analysis of cyclohexane
5	M	Oct. 18	7.1-7.13	Stereochemistry: introduction, R/S nomenclature
	W	Oct. 20	7.1-7.13	Stereochemistry: molecules with multiple chirality centers
	F	Oct. 22	1.12-1.18	Acid/base chemistry, *Quiz*
6	M	Oct. 25	1.12-1.18, 4.10	Acid/base chemistry, reaction mechanisms, stability rules
	W	Oct. 27	5.6, 5.8-5.16	alkene stability, elimination reactions
	F	Oct. 29	5.6, 5.8-5.16	elimination reactions, *Quiz*
7	M	Nov. 1st	5.8-5.16	elimination reactions
	W	Nov. 3	8	nucleophilic substitution reactions
	F	Nov. 5	8	nucleophilic substitution reactions, *Quiz*
8	**M**	**Nov. 8**	***EXAM II (65 minutes)***	
	W	Nov. 10	8, 5.1-5.7	competition between substitution and elimination reactions, nomenclature of alkenes
	F	Nov. 12	6	reactions of alkenes
9	M	Nov. 15	6	reactions of alkenes
	W	Nov. 17	6	reactions of alkenes
	F	Nov. 19	6	reactions of alkenes, *Quiz*
	THANKSGIVING HOLIDAY Nov. 22-26			
10	M	Nov. 29		organic synthesis and review
	W	Dec. 1st		organic synthesis and review
	F	Dec. 3		organic synthesis and review

FINAL EXAM: Wednesday, Dec. 8, 9:10 AM to 12:10 PM