

West Los Angeles College Summer 2015 Syllabus

Chemistry 211 (Organic Chemistry 1)

Instructor: Dr. Mesfin Alemayehu

Lecture: MTWThF 8:00 – 9:30 am Rm # MSA 111

Lab: MTWTh 9:30am -12:30 pm Rm # MSA 412

Tel: (310) 287-4299

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Course description and Objectives

Chemistry 211 (formerly Chemistry 14) is an organic chemistry course primarily for students who wish to continue in the fields of chemistry, pharmacy, medicine, dentistry etc

Discussions in this course will include: Molecular structure of organic compounds, bonding, stereochemistry, short-step synthesis and functional group chemistry with emphasis on reaction mechanisms. The laboratory work focuses on techniques of synthesis, isolation, purification and instrumental analysis of organic compounds. Chem. 211 provides the foundation for further work in Organic chemistry II (Chem. 212) and Biochemistry.

Lecture hours per week: 3

Lab hours per week: 6

Prerequisites:

A grade of C or better in Chemistry 102 is a prerequisite for enrollment in Chem. 211.

Text Book:

Lecture: Solomons, Fryhle "Organic Chemistry" 11th Edition

Lab: Mohrig, Hammod and et al, "Modern Projects and Experiments in Organic Chemistry" (Mini scale and Williamson Micro scale) 2nd edition

Optional Reading Materials:

There is also a study guide for Solomons that has solutions to the problems. The following books are also suggested: "Organic Chemistry" by Morrison and Boyd, "Organic Chemistry", "Organic Chemistry" by Brown; "Organic Chemistry" by Ege. Please understand that you can not learn by only attending classes, or by merely reading your notes or textbook. This course requires a lot of practicing in writing molecular structures, names of molecules, reagents and reactions. There is no substitute of continuous effort to working out problems on your own. You should seek help only after you have done your best to solve the problem.

Student Learning outcome (SLO): Upon successful completion of chemistry 211, the you will be able to:

- Recognize and explain the bonding in organic compounds.
- Recognize and name major organic functional groups-: Alkane, alkenes, alkynes, haloalkanes, alcohols, ethers, alkyl halides, including their structure and bonding; physical and chemical properties, methods of preparation; reactions and mechanisms
- Interpret IR spectrum
- Draw the structural formula and the name of organic compounds.
- Do conformation analysis of alkane.
- Recognize the different types of Isomerism including stereoisomers.
- Explain the relationship between structure of an organic compound and its properties.
- Demonstrate knowledge of the following reaction intermediates: Radicals, Carbocations, Carbanions and Carbenes
- Understand and explain Resonance and Inductive effects on the stability of intermediates
- Predict reaction mechanisms as SN1, SN2, EI, E2, radical or electrophilic addition reactions, based on structure and reaction conditions
- Apply Lab safety rules
- Be familiar to basic organic chemistry laboratory techniques and develop lab. skills
- Set-up an experiment
- Demonstrate the use of some basic lab. equipment and analytical instruments to identify organic compounds
- Explain observations
- Apply theory in lab work
- Analyze data and come to a conclusion
- Calculate physical and chemical quantities

- Measure physical quantities
- Apply scientific methods in solving problems
- Prepare organic compounds in two or three steps
- Practice the safe use of chemicals
- Demonstrate skills and laboratory techniques for purification of organic compounds, separation of mixtures, extraction of natural products and short step synthesis of drugs.
- Write laboratory reports based on collected experimental data and results

Laboratory:

Chemistry 211 is a laboratory course. Failure to perform the experiments and hand in the work will result in an unsatisfactory grade in the course. For reasons of safety, lab work must be done only during the assigned laboratory periods and when the instructor is around.

NOTE: You must wear eye protection whenever you are in the lab. If you do not have the appropriate eye protection you may be dismissed from the laboratory section with loss of credit for that exercise.

Do not wear contact glasses in the lab. They can absorb or trap some organic vapors and fumes and could cause eye damage. Eating or drinking in the lab is prohibited. Read the instructions and the procedure for the experiment before coming to the lab. Preparing flow charts before coming to the lab will help you to finish the experiment in time and prevents avoidable accidents from happening.

Record all the data (including your observations) **in ink in a stiff-covered bound lab notebook**. Have your lab instructor sign your notebook before you leave the lab at the end of the each lab period.

Your Report Should Contain the Following Sections:

- I. Date the experiment was performed
- II. Title of the experiment
- III. Objective of the experiment (this is a brief statement of the purpose of the experiment)
- IV. Chemicals and reagents used (include their molecular formula, molar mass, mp, bp, amounts used, reaction equations if known, etc.)
- V. Procedure (at least indicate name and page of source)

- VI. Observations: Any observation made during the experiment (data collected, color changes and other visible changes) should be recorded.
- VII. Calculations and graphs
- VIII. Discussion and conclusions: If possible, compare your results to known (accepted) values (consult your textbook, and physical or chemical handbooks and indicate your reference source). Comment on the results you obtained in relation to the principles of the experiment and the acceptable value from literature .

There are some services on campus for students with learning disabilities. Such students may contact the office and get the appropriate help and accommodations

Lab Grade Distribution:

Attendance	75 pts
Pre-lab report	20 pts
Participation in lab	20 pts
Lab Exam and report/write up	35 pts
Total Lab Points	150

Examination and Final Grade Distribution:

During exams students may leave the exam hall only after submitting their exam paper. A student who left the hall for any reason may not be allowed to come back and finish the exam or make any changes in his/her answers.

A student, who comes to the exam hall after the exam is started, may not be allowed to take the exam, if at least one student has left the exam hall before he/she came into the hall.

Cell phones and Beepers must be completely turned off during class time.

Final exam in the lecture will **be inclusive**. Final grades will be assigned primarily on the basis of points accumulated as follows:

3 lecture exams	300 pts
1 final exam	250 pts
Performance in lab	150 pts
Student project	50 pts
Total Points	750 pts

A starts at 85% B starts at 75% C starts at 60% D starts at 50%

A passing grade will be contingent on successful completion of assigned experiments. There will be no **make-up lab** or **exam**. A grade of zero will be assigned for a missed lab or exam. You are responsible for information, exam announcements, date changes, etc. presented in class, whether or not you are present. Students who are absent for 3 consecutive class meetings or 6 class meetings throughout the course without presenting a valid excuse could be dropped from the class.

Withdrawal From Class: You are responsible for your credit and enrollment status. Any student withdrawing from class must officially inform the admissions office of his/her decision. **Students who fail to follow the correct procedure for withdrawals will receive a grade of F for the course at the end of the semester.**

Last day to drop without a "W" is June 22, 2015

Last day to drop with a "W" is July 24, 2015

If the dates fall on a holiday use the telephone registration system to drop classes

For important deadlines, please refer to the spring semester class schedule.

The college academic honesty policy (please read catalog) will absolutely be upheld in this course. Neither cheating nor copying will be tolerated.

TENTATIVE LECTURE SCHEDULE

<u>Week of</u>	<u>Lecture Topic</u>	<u>Chapter Reading</u>
June 15	Carbon compounds and chemical bonds	1
	Representative Carbon compds. Functional groups, IR	2
June 22	An introduction to organic reactions-acid and base	3
	EXAM # 1 (CHAPTERS 1, 2, 3)	
	Alkanes, Nomenclature, Conformational analysis and introduction to synthesis	4
June 29/July 6	Stereochemistry -chiral molecules	5
	Ionic Reactions- Nucleophilic substitution and Elimination reactions of alkyl halides	6
	EXAM # 2 (Chapters 4, 5, 6)	
July 13	Alkenes and Alkynes I. –Preparation and synthesis	7
	Alkenes and Alkynes II. –Addition reaction	8

<i>July 20</i>	NMR and Mass Spectroscopy Tools for Structure Determination	9
	EXAM # 3 (chaptrs 7, 8, 9)	
	Radical Reactions	10
	(Part of this chapter is discussed in chapters 4 and 8)	
<i>July 27Aug 3</i>	Alcohols and Ethers	11
	(some preparation methods and reactions of alcohols are discussed in chapters 7and 8 also)	
	Alcohols from carbonyl compds, Oxidation-Reduction and Organometalic compds.	12
	Conjugated unsaturated systems :	13

FINAL EXAM : week of August 3

Chem. 211 Tentative Lab Schedule

Lab No.	Title	source	No. of lab periods
1	Check in & Orientation	Video	1
2	Melting point determination	Handout	1
3	Recrystallization	Handout	1
4	Distillation	Handout	1
5	Orientation and the use of, analytical instruments (GC, IR...)		1
6	Extraction of Caffeine from tea	Mohrig (E. 1)	1
7	Synthesis of ethanol by Fermentation	Mohrig (E. 3)	2
8	Molecular Modeling	Handout	2
9	Synthesis of Salicylic acid	Mohrig (E. 4)	1
10	Synthesis of Aspirin	Mohrig (E. 5)	1
11	Analysis and comparison of products from E. 4 and E.5 (Chemical, MP, IR)		1
12	Synthesis and analysis of Ethers (GC and IR)	Handout	2
13	Saponification	Handout	1
14	Isolation of Limonene from Orange peels	Mohrig (E. 6.2)	1
15	Preparation and Identification of Alkyl bromide	Mohrig (E. 9)	2
16	Using extraction to separate a mixture	Mohrig (P 2.1, 2.2)	2
17	E1/E2 Elimination	Mohrig (P. 6.1, 6.2, 6.3 & 3.2)	2

18	Stereochemistry of bromine addition to trans- cinnamic acid	Mohrig (E. 16.2)	1
19	Dehydration of alcohols	Mohrig (E.11)	1
20	Preparation of Vanillin	Handout	1
21	Checkout		1

E = Experiments, P = Projects