IMPERIAL COMMUNITY COLLEGE DISTRICT
IMPERIAL VALLEY COLLEGE

COURSE OUTLINE

DIVISION: Science, Mathematics, and Engineering **DATE**: October 12, 2005

COURSE TITLE: Organic Chemistry I **COURSE NO.**: CHEM 204 **UNITS**: 5 .

LEC HRS: 3 . **LAB HRS**: 6 . **HRS. TBA**: 0 .

If cross-referenced, please complete the following:

COURSE NO. (s): _____. **COURSE TITLE**: _____.

I. COURSE/CATALOG DESCRIPTION:

This course is a study of various reaction mechanisms and properties of hydrocarbons, alkyl halides, alcohols, thiols, and ethers. Stereochemical properties of compounds are investigated and related to structure and observed reactions. Instrumental methods of analysis such as IR, UV-VIS, NMR, and mass spectrometry are discussed. This course is intended for students majoring in chemistry, biology, and pre-medical sciences.

II. A. PREREQUISITES, IF ANY:

CHEM 202 with a grade of "C" of better.

B. CO-REQUISITES, IF ANY:

None.

C. RECOMMENDED PREPARATION, IF ANY:

None.

III. GRADING CRITERIA:

X . Course must be taken on a "letter-grade" basis only.

_____. Course may be taken on a "credit" basis or for a letter grade.

_____. Course must be taken on a "credit" basis only.

IV. MEASURABLE COURSE OBJECTIVES AND MINIMUM STANDARDS FOR GRADE OF "C":

1. Student will demonstrate knowledge covalent bonding and molecular geometry.

2. Student describes structure and reactions of alkanes and cycloalkanes.

3. Student will demonstrate knowledge organic acids and bases.

4. Student will demonstrate knowledge of stereochemistry and its effects of molecular properties.

5. Student will demonstrate knowledge of the structure and reactions of alkenes.

6. Student will demonstrate knowledge of alkyl halides and radical reactions.

7. Student will demonstrate knowledge of nucleophilic substitution and beta elimination.

8. Student will demonstrate knowledge of the structure and reactions of alcohols and thiols.

9. Student will demonstrate knowledge of the structure and reactions of alkynes.

10. Student will demonstrate knowledge of the structure and reactions of ethers, sulfides, and epoxides.

11. Student will identify organic molecules using various instrumental methods such as mass spectrometry and nuclear magnetic resonance spectrometry (NMR) as well as infrared (IR) and UV-Visible spectroscopy.

V. CORE CONTENT TO BE COVERED IN ALL SECTIONS:

	CORE CONTENT	APPROX % OF COURSE
1.	Covalent bonding and molecular geometry. A. Electronic structure of atoms and the Lewis model of bonding B. Functional groups C. Bond angles and molecular shape D. Polar and nonpolar molecules E. Resonance F. Quantum Mechanics and Molecular Orbital Theory	9%
2.	Alkanes and cycloalkanes. A. Structure and nomenclature of alkanes and cycloalkanes B. Isomerism in alkanes and cycloalkanes C. Conformations of alkanes and cycloalkanes	9%
3.	Organic acids and bases A. Acid-Base theories: Arrhenius, Bronsted-Lowry, & Lewis B. Quantitative measure of acid and base strength C. Relation of molecular structure to acidity D. Equilibrium calculations	9%
4.	Stereochemistry A. Isomerism & chirality B. Naming enantiomers C. Fisher projections D. Properties of stereoisomers: optical activity E. Separation of enantiomers	9%
5.	Alkenes A. Structure and nomenclature of alkenes B. Physical properties of alkenes C. Reaction mechanisms D. Reactions of alkenes: electrophilic addition, oxidation & reduction E. Chiral products and reactants	9%
6.	Alkyl halides and radical reactions A. Structure and nomenclature of alkyl halides B. Physical properties of alkyl halides C. Halogenation reactions and their mechanisms D. Organometallic compounds	9%
7.	Nucleophilic substitution and beta elimination A. Reaction conditions and mechanisms for nucleophilic substitution reactions B. Evidence for S_N1 and S_N2 mechanisms C. Phase-transfer catalysis D. Mechanisms of beta eliminatinon E. Evidence for E1 and E2 mechanisms	9%

8.	Alcohols and Thiols A. Structure and nomenclature of alcohols and thiols B. Physical properties and acidity of alcohols and thiols C. Reactions with active metals D. Conversion to alkyl halides E. Dehydration of alcohols F. Oxidation of alcohols	9%
9.	Alkynes A. Structure, nomenclature, and physical properties of alkynes B. Acidity of alkynes C. Reactions of alkynes: preparation, reduction, hydroboration, & electrophilic additions D. Introduction to organic synthesis	9%
10.	Ethers, sulfides, and epoxides A. Structure, nomenclature, and physical properties B. Preparation of ethers, sulfides, and epoxides C. Reactions of ethers and epoxides D. Crown ethers	9%
11.	Instrumental Methods A. Mass spectrometry: instrumentation and the interpretation of spectra B. NMR: Instrumentation and the interpretation of spectra C. Carbon-13 NMR D. IR and UV-VIS Spectroscopy: interpretation of spectra	10%

VI. METHOD OF EVALUATION TO DETERMINE IF OBJECTIVES HAVE BEEN MET BY STUDENTS: (Check all that apply.)

Essay	X .	Class Activity	X .	Written Assignments	X .
Problem Solving Exercise	X .	Final Exam	X .	Oral Assignments	X .
Skill Demonstration	X .	Objective	X .	Quizzes	X .
Other	_____ .				

INSTRUCTIONAL METHODOLOGY: (Check all that apply.)

Lecture	X .	Discussion	X .	Demonstration	X .
Audio Visual	X .	Group Activity	X .	Lab Activity	X .
Computer Assisted Instruction	X .	Individual Assistance	X .	Simulation/ Case Study	__ .

Two (2) hours of independent work done out of class per each hour of lecture or class work, or 3 hours lab, practicum, or the equivalent per unit.

VII. TEXTBOOK(S) AND SUPPLEMENT(S):

Wade, Leroy G. *Organic Chemistry*. 5th edition. Prentice Hall, 2003.

Brown, William H. and Christopher S. Foote. Organic Chemistry. 2nd ed. Fort Worth, TX: Saunders College Publishing. 1998.

Schoffstall, Allen M. et al. Microscale and Miniscale Organic Chemistry Laboratory Experiments. Boston: McGraw Hill. 2000

Carey, Francis A. Oragnic Chemistry. 4th ed. Boston: McGraw Hill. 2000

Luceigh, B.A. ChemTV: Core Organic Chemistry. Sudbury, MA: Exeter Multimedia Publishing. 1997.

Stanitski, Conrad, ed. Chemistry in Context: Applying Chemistry to Society. 3rd ed. New York: McGraw Hill. 2000.