College of San Mateo
Official Course Outline

1. **COURSE ID:** CHEM 231 **TITLE:** Organic Chemistry I **C-ID:** CHEM 150, CHEM 160S (CHEM 231 & 232)
   Units: 5.0 units **Hours/Semester:** 48.0-54.0 Lecture hours; 96.0-108.0 Lab hours; and 96.0-108.0 Homework hours
   Method of Grading: Letter Grade Only
   Prerequisite: CHEM 220
   Recommended Preparation:
   ENGL 838, or ENGL 848

2. **COURSE DESIGNATION:**
   Degree Credit
   Transfer credit: CSU; UC
   AA/AS Degree Requirements:
   CSM - GENERAL EDUCATION REQUIREMENTS: E5a. Natural Science
   CSU GE:
   CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B1 - Physical Science
   CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B3 - Laboratory Activity
   IGETC:
   IGETC Area 5: PHYSICAL AND BIOLOGICAL SCIENCES: A: Physical Science
   IGETC Area 5: PHYSICAL AND BIOLOGICAL SCIENCES: C: Science Laboratory

3. **COURSE DESCRIPTIONS:**
   Catalog Description:
   Introduction to basic concepts of structure and reactivity of organic compounds; reactions of major functional groups; reaction mechanisms; and synthesis. Principles and practice of laboratory techniques; methods of separation, purification, and synthesis. Designed as the first semester of a one-year organic course or as a one-semester survey. Extra supplies may be required.

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**
   Upon successful completion of this course, a student will meet the following outcomes:
   1. Apply a general understanding of structure and properties of organic compounds (analysis/knowledge/comprehension).
   2. Demonstrate knowledge of IUPAC nomenclature system and apply to range of simple organic compounds (Knowledge/comprehension/application).
   3. Demonstrate understanding of theories of stereochemistry and relate theories to structure and properties (Comprehension/analysis).
   4. Analyze spectroscopic data to determine molecular structure (application/analysis).
   5. Comprehend, compare and contrast nucleophilic substitution reactions and elimination reactions (application/analysis).
   6. Develop laboratory skills with special reference to organic synthesis and structural determination (synthesis/analysis).

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**
   Upon successful completion of this course, a student will be able to:
   1. Apply a general understanding of structure and properties of organic compounds (analysis/knowledge/comprehension). Various laboratory group question and exam questions will be used to ensure mastery.
   2. Demonstrate knowledge of IUPAC nomenclature system and apply to range of simple organic compounds (knowledge/comprehensive/application). Various exams, quizzes, lab exercises, notebooks and reports will require application of this skill.
   3. Demonstrate understanding of theories of stereochemistry and relate theories to structure and properties (comprehension/analysis). Exam and quiz questions along with computer structure analysis will be used for this skill.
   4. Analysis spectroscope data to determine molecular structure (application/analysis). Various spectroscopic techniques will be used in lab involving combinations of instruments, textbooks examples and computer

simulations will ensure mastery of this material.
5. Comprehend, compare and contrast nucleophilic substitution reactions and elimination reactions (application/analysis). Exam, quiz and lab report work will be used to evaluate this skill.
6. Develop laboratory skills with special reference to organic synthesis and structural determination. (synthesis/analysis) Various laboratory exercises, computer simulations and exam questions will evaluate this skill.

6. **COURSE CONTENT:**

Lecture Content:

Introduction to basic concepts of structure and reactivity of organic compounds: nomenclature; stereochemistry.
Properties, reactions and synthesis of major functional groups: alkenes, alkynes and alcohols.
Reaction mechanisms: Nucleophilic substitution; electrophilic addition and elimination.

Lab Content:

Laboratory technique in safe handling of solids and liquids.
Synthesis techniques: heating under reflux; distillation; vacuum filtration; recrystallization;
Instrumental and spectroscopic technique including use of FT-IR and GC; melting point and boiling point determination.

TBA Hours Content:

No TBA requirement for this course.

7. **REPRESENTATIVE METHODS OF INSTRUCTION:**

Typical methods of instruction may include:

A. Lecture
B. Activity
C. Other (Specify): The course will include the following instructional methods as appropriate, in approximate order - Lecture format used to introduce new concepts and information; time will be provided to encourage student participation in question/answer period. - Theory, purpose, and practice of the lab experiment will be outlined by the instructor during the laboratory session. Student will perform experiments on individual basis/ some experiments are class projects that require assigned student groups. - Class participation in the evaluation of data collected. - Where appropriate, selected topics will be complemented by multimedia resources.

8. **REPRESENTATIVE ASSIGNMENTS**

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

End-of-Homework chapter questions which include both short answers and short-essay type answers.

Tutorial questions which may include essay-type questions. Students are required to explain concepts and provide examples.

Laboratory reports. Students are taught to prepare lab reports to include title, objective, background information, procedure, results, data analysis and conclusion.

Reading Assignments:

Textbook-based reading to prepare for and support classroom learning.
Where appropriate, journal articles in either print or online format that supports content learning. For example: articles on historic discovery of stereospecific properties in organic compounds; novel industrial application of various classes of organic compounds; introduction of green chemistry principles in pharmaceutical industry.

9. **REPRESENTATIVE METHODS OF EVALUATION**

Representative methods of evaluation may include:

A. Exams/Tests
B. Homework
C. Lab Activities

D. Quizzes
E. Methods may include frequent exams covering two or three chapters of the text. (short questions, multipart questions, problem solving) - Regular end-of-chapter quizzes -Lab write-ups for each experiment, which include purpose, a detailed procedure, analysis of results, and answers to questions designed to elicit critical thinking. Some experiments are selected for more exhaustive treatment in style appropriate for professional laboratory manuals. For these write-ups, the student clarifies the purpose of the experiment, develops and rationalizes the experimental protocol, and justifies conclusions drawn from results.

10. **REPRESENTATIVE TEXT(S):**
Possible textbooks include:
A. McMurry. *Organic Chemistry*, 8th ed. Brooks Cole, 2014
B. Klein, D.. *Organic Chemistry*, 2nd ed. Wiley, 2013
C. -. *Study Guide for McMurray's Organic Chemistry*, 8th ed. -, 2014
Other:
A. Pavia, Kriz, Lampman, Engel, Micro and Macro Techniques in the Organic Laboratory, Saunders College
B. Occasional topical articles assigned to maintain currency of lecture material.

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Course Originator: Catherine Ciesla