STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK

COURSE OUTLINE

CHEM 301 – Organic Chemistry I

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SCHOOL OF SCIENCE, HEALTH & PROFESSIONAL STUDIES
SCIENCE DEPARTMENT
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CHEM 301– Organic Chemistry I

A. **TITLE:** Organic Chemistry I

B. **COURSE NUMBER:** CHEM 301

C. **CREDIT HOURS:** 4 credit hours

D. **WRITING INTENSIVE COURSE (OPTIONAL):** N/A

E. **COURSE LENGTH:** 15 weeks

F. **SEMESTER(S) OFFERED:** Fall

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
Three hours lecture per week and three hours of laboratory per week

H. **CATALOGUE DESCRIPTION:**
Organic Chemistry I is the first semester of a two semester sequence of organic chemistry which is applicable for Liberal Arts: Science and Engineering Science curricula. The lecture portion of the course will include chemical bonding, acid/base theory, thermodynamics, kinetics, organic structure, isomerism, stereochemistry, infrared spectroscopy, CMR/PMR nuclear magnetic resonance spectroscopy, mass spectroscopy, nomenclature principles, and the chemistry of several organic chemical functional groups. The laboratory portion of the course will include methods of purification/separation of organic chemicals, chemical kinetics, instrumental analysis techniques, and several organic syntheses. Three hours lecture and three hours laboratory per week.

I. **PRE-REQUISITES/CO-COURSES:** CHEM 155 (College Chemistry II)

J. **GOALS (STUDENT LEARNING OUTCOMES):**

The student learning outcomes listed in the following table are applicable to both CHEM 301 and 302 and are consistent with the American Chemical Society's Committee on Professional Training Organic Chemistry Curriculum Supplement(August 2008)

Course Student Learning Outcomes	*Institutional SLO*
1. Define chemical bonding and its consequences on the molecular structure and reactivity of organic chemicals	3. Prof. Competence
2. Define polar bonds , molecular polarity, acids and bases and predict how the terms influence the chemical behavior of organic chemicals	2. Crit. Thinking 3. Prof. Competence
3. Know the structure, IUPAC/CAS nomenclature, stereochemistry, preparation and reactions of organic chemical functional groups	3. Prof. Competence
4. Using the basic preparative reactions and the reactions of organic functional groups perform multistep syntheses including retrosynthetic analysis of target molecules	2. Crit. Thinking 3. Prof. Competence
5. Define the basic principles of infrared spectroscopy,	3. Prof. Competence

CMR/PMR resonance spectroscopy, ultraviolet spectroscopy, and mass spectroscopy and interpret the aforementioned spectroscopies to elucidate the structure and/or identification of an organic chemical compound	
6. Perform basic laboratory skills associated with the synthesis, isolation, and purification of organic chemical compounds, monitor the progress of an organic chemical reaction and maintain a laboratory notebook as a record of laboratory exercises	1. Communication 2. Crit. Thinking 3. Prof. Competence

K. **TEXTS:**
Karty, Joel, *Organic Chemistry: Principles and Mechanisms,* W.W. Norton and Co. Inc., New York, NY, 2014, with *SmartWork*® Online Homework Access

Heldt, N., *Organic Chemistry I, Laboratory Manual, Fall 2015,* on-line via Blackboard

L. REFERENCES: N/A

M. EQUIPMENT: N/A

N. GRADING METHOD: (A-F)

O. MEASUREMENT CRITERIA/METHODS:

Class Grade (quizzes, exams, online graded homework)	60%
Laboratory Assignments and Practical	25%
Comprehensive Final Exam	15%

P. DETAILED TOPICAL OUTLINE:

Lecture

1. Atomic and Molecular Structure and Nomenclature
2. Three- Dimensional Geometry, Intermolecular Interactions, and Physical Properties
3. Orbital Interactions 1: Hybridization and Two- Center Molecular Orbitals
4. Isomerism 1: Conformational and Constitutional Isomers
5. Isomerism 2: Chirality, Enantiomers, and Diastereomers
6. The Proton Transfer Reaction: An Introduction to Mechanisms, Thermodynamics, and Charge Stability
7. An Overview of the Most Common Elementary Steps
    a. Molecular Orbital Theory and Chemical Reactions
8. An Introduction to Multistep Mechanisms: SN1 and E1 Reactions
9. Nucleophilic Substitution and Elimination Reactions 1: Competition among SN2, SN1, E2, and E1 Reactions
10. Nucleophilic Substitution and Elimination Reactions 2: Reactions That Are Useful for Synthesis
11. Electrophilic Addition to Nonpolar π Bonds 1: Addition of a Brønsted Acid
12. Electrophilic Addition to Nonpolar π Bonds 2: Reactions Involving Cyclic Transition States

Laboratory

1. Chemical Safety and Biogenesis of Ethanol from Molasses
2. Simple Distillation of Ethanol
3. Fractional Distillation
4. Melting Point Identification
5. Isomer Synthesis
6. Isomer Identification
7. Extraction of Caffeine from Tea
8. Recrystallization of Crude Caffeine
9. Thin Layer Chromatography of Analgesics
10. Kinetics of Alky Halide Reactions
11. Synthesis of an Ester
12. Synthesis of a Ketone
13. Dehydration of alcohol (Elimination reaction)
14. Lab Practical