**MOHAWK VALLEY COMMUNITY COLLEGE**

**UTICA AND ROME, NEW YORK**

### COURSE OUTLINE

**CH248--Organic Chemistry II** **C-3, P-4, Cr-5**

**Catalog Description**

Pre-requisites: CH 247 Organic Chemistry 1

This course is the continuous of CH247 Organic Chemistry I. It stresses reaction mechanisms, methods of synthesis, structure, optical activity, chemical physical properties, and nomenclature. Topics include aromatic compounds, carbonyl and carboxylic compounds, amine and heterocycles, and spectroscopy.

**Student Learning Objectives**

Upon the completion of Organic Chemistry II, the students will be able to:

1. Demonstrate an understanding of the principles of atomic and molecular structure, bonding and acid-base chemistry.

2. Properly draw the structural formula/ write the IUPAC name, and demonstrate an understanding of the properties, of organic molecules with the following functional groups:

1. Aromatic compounds
2. Ehters and epoxides, thiols and sulfides
3. Aldehydes and ketones
4. Carboxylic acids and nitriles
5. Carboxylic acid derivatives
6. Amines and heterocycles

3. Visualize the stereochemical structure of organic molecules in chemical reactions.

4. Demonstrate an understanding of the kinetics and thermodynamics involved in chemical reactions.

5. Use chemical and physical properties to aid in the identification of organic compounds.

6. Present the chemical reactions of the different functional groups studied (see item 2), and reasoning with reaction mechanisms.

7. Devise methods to synthesize organic compounds.

8. Utilize up-to-date instrumentation (UV-Vis and FTIR) in the laboratory.

9. Use communication skills effectively through written exams and lab reports.

10. Demonstrate critical thinking skills by predicting reactions and determining how to best synthesize certain organic compounds.

11. Demonstrate an understanding of hazardous waste and safety precautions that must be followed when dealing with organic chemicals.

12. Demonstrate an understanding of the importance of organic chemistry in life science and the world around.

**Major Tiopics**

Basic concepts — bond dissociation energies; structures and properties of ethers, alkyldienes and polyunsaturated hydrocarbons, aromatic compounds, carbonyl compounds and amines; aromaticity of benzene and other aromatic compounds; stability of allyllic radicals and cations, conjugated dienes; resonance theory; acidity of α-hydrogens of carbonyl compounds; keto-enol tautomerism; basicity of amines.

Organic Nomenclature — IUPAC Nomenclature of ethers, aromatic compounds, carbonyl compounds and amines and amides.

Mechanisms — mechanisms of most reactions listed below.

Synthesis — retro-synthetic analysis; synthesis of organic compounds.

Reactions — electrophilic aromatic substitution reactions, halogenation, nitration, sulfonation; Friedel-Crafts alkylation, Friedel-Crafts acylation, effects of substituents on reactivity and orientation; reactions of alkyl side chains on aromatic rings, benzylic halogenation, addition to alkenyl benzenes, oxidation of alkyl side chains; synthesis of ethers, Williamson synthesis and ethers as protecting groups; reactions of ethers; cleavage of ethers by strong acids; alkene epoxidation, acid and base ring-opening of epoxides; nucleophilic addition reactions of aldehydes and ketones, Grignard reaction, addition of hydride ion, addition of amine; halogenation of aldehydes and ketones; reduction of carbonyl compounds; reactions of carboxylic acids, relative acidity, reduction reactions, conversion to acyl chlorides, acid anhydrides, esters, amides; reactions of acid anhydrides; reactions of esters-conversion to carboxylic acids, amides and alcohols; reactions of amides-hydrolysis, conversion to nitriles; acid and based-catalyzed enolization of ketones; aldol addition and condensation reactions; synthesis of amines and aryl amines; diazotization of primary arylamines and replacement of the diazonium group (Sandmeyer reaction)

**Organic Chemistry II** **LABORATORY SCHEDULE**

The Organic Chemistry Laboratory sequence should accomplish several objectives: Illustrate organic lab techniques, demonstrate organic synthesis, demonstrate analysis of organic compounds, illustrate descriptive chemistry, and reinforce concepts presented in lecture.

The following sequence of laboratory exercises is one of many that would serve the purpose of the organic laboratory:

Experiments

33-Triphenylmethanol

51-Photoreduction of benzophenone and rearrangement of benzpinacol to benzopinacolone

Handout-Chromic acid oxidation of alcohols

43- Nitration of methyl benzoate

Handout- P-Aminobenzoic acid

44-Benzocaine

32- Preparation of benzoin, preparation of benzil

37- The Aldo Condensation Reaction: Preparation of Benzalacetophenones

55-Idetification of Unknowns

45-N,N-Diethyl-*m*-Toluamide

52- Luminol

Updated on 4/11/2018