NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY Revised 5/2020
CHM 242 - ORGANIC CHEMISTRY II (3 CR.)

Course Description
Introduces fundamental chemistry of carbon compounds, including structures, physical properties, syntheses, and typical reactions. Emphasizes reaction mechanisms. Part II of II. Lecture 3 hours per week.

General Course Purpose
This is a transfer course in organic chemistry for science majors that will satisfy various pre-heath degree requirements. This course is designed for students pursuing Bachelor's degrees in chemistry, chemical engineering and biology, and as a prerequisite for students seeking professional degrees in medical, pharmaceutical, dental, and veterinary programs and for certain advanced nursing programs.

Course Prerequisites/Corequisites
Prerequisite: CHM 241 with a C or higher or permission of the instructor.

Course Objectives
Upon completion of the course students will be able to:
- Distinguish specific classes of organic compounds and their types of reactions (such as amines, aldehydes, ketones, ethers, phenols, arenes, carboxylic acids, and carboxylic acid derivatives)
- Generate and analyze reactions for specific classes of organic compounds (such as amines, aldehydes, ketones, ethers, phenols, arenes, carboxylic acids, and carboxylic acid derivatives)
- Use the information from the UV/Vis, IR, NMR and Mass Spectra to deduce the structure of the organic compounds
- Complete challenging multistep syntheses of the specific classes of compounds such as amines, aldehydes, ketones, ethers, phenols, arenes, carboxylic acids, and carboxylic acid derivatives
- Generate IUPAC nomenclature and common names of the classes of compounds such as amines, aldehydes, ketones, ethers, phenols, arenes, carboxylic acids and carboxylic acid derivatives
- Account for the physical properties and chemical reactivity of any organic compound on the basis of structure

Major Topics to be covered
1. Identification of compounds based on $_{1}$H-NMR, $_{13}$C-NMR, IR and mass spectroscopy data.

2. Properties and reaction of conjugated systems, (including addition to conjugated alkenes and the Diels-Alder reaction) and their characterization through UV-Vis spectroscopy.

3. Nomenclature, structures, physical properties, methods of preparation, and reactions of:
    a. Aromatic compounds (Aromatic, anti-aromatic, and non-aromatic compounds)
        i. Electrophilic aromatic substitution reactions (including halogenation, nitration, sulfonation, Friedel-Crafts alkylation and acylation reactions) and the effect of substituents on the regiochemistry of aromatic substitution.
    b. Aldehydes and ketones (including oxidations, reductions, imine and enamine formation, ketal and acetal formation, and deoxygenation reactions and the Grignard reaction).
    c. Carboxylic acids and the carboxylic acid derivatives (acid halides, acid anhydrides, esters, amides, and nitriles)
    d. Amine compounds (including alkylation, acylation, elimination, oxidation, and diazotization)

4. Addition and condensation reactions of the enols and enolate ions including alpha-bromination, malonic/acetoacetic ester synthesis, Aldol condensation, Wittig reaction, Claisen condensation, and the Michael reaction.
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5. Addition and condensation polymerization, radical reactions

Optional Topics
1. Classification, structure, stereochemistry, chemical and physical properties of amino acids and saccharides
2. Synthesis and reactions of the amino acids, peptides, and proteins.
3. Fischer's work on the absolute configuration of the monosaccharides and reactions of sugars.
4. Chemistry of Lipids
5. Chemistry of Heterocycles