

SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: CHEM 420 Department: Chemistry

Course Title: Organic Chemistry 2 Semester: Spring Year: 2001

Objectives/Competencies

Course Objective	Competencies
1. To learn the various reactions of carbonyl compounds that can form alcohols.	1. Recognize the structure of the carbonyl group. 2. Become familiar with the physical characteristics of the carbonyl compound. 3. Understand the mechanism in which nucleophiles react with the carbonyl group. 4. Be familiar with the principles of oxidation and reduction of organic compounds. 5. Recognize common oxidation and reducing agents.
2. To learn how to synthesize organolithium and organomagnesium compounds and become familiar with their chemical reactions.	1. Understand the polarity and basicity of an organometallic compound. 2. Recognize the limitations of these compounds in the presence of acidic hydrogen atoms. 3. Know how to plan a Grignard synthesis.
3. To be able to recognize a conjugated unsaturated system and understand the unusual chemistry that these types of systems can undergo.	1. Draw molecular orbital diagrams for the allylic carbocation and free radical. 2. Understand the stability of this carbocation or free radical

Course Objective	Competencies
4. To learn to understand the unique physical and chemical characteristics of aromatic compounds and their nomenclature.	in terms of resonance. 3. Understand the rules of writing resonance structure. 4. Estimate the relative stability of resonance structures. 5. Be familiar with kinetic control versus thermodynamic control of a chemical reaction. 1. Recognize some of the most common aromatic compounds with their common names. 2. Understand the ortho, meta, and para designations for the positions of groups within an aromatic compound. 3. Be able to draw a molecular orbital diagram for benzene to explain the concept of aromaticity. 4. Understand Huckel's Rule to help predict whether a molecule will have any aromatic character. 5. Recognize aromatic ions. 6. Recognize heterocyclic aromatic compounds.
5. To understand the unique chemical reactions of aromatic compounds.	1. Understand the general mechanism for electrophilic aromatic substitution. 2. Recognize the general mechanism in the most common reactions that benzene undergoes. 3. Know the limitations of some of these reactions. 4. Know the synthetic applications of these common reactions. 5. Understand and predict the effect of substituent on reactivity and orientation.

Course Objective	Competencies
6. To learn the names of aldehydes and ketones.	<ol style="list-style-type: none">1. Recognize the general structure of an aldehyde or ketone.2. Know the common and IUPAC rules of nomenclature.
7. To learn the physical and chemical properties of aldehydes and ketones.	<ol style="list-style-type: none">1. Understand the general physical and chemical properties of the carbonyl group in general.2. Understand the synthesis of aldehydes and ketones.3. Recognize the process of nucleophilic addition to the carbon-oxygen double bond.4. Recognize the reversibility of nucleophilic additions to the carbon-oxygen bond.5. Be familiar with the addition of ammonia derivatives to the carbonyl group.6. Understand the principles of acidity of the alpha hydrogens of carbonyl compounds.7. Know the principle of keto-enol tautomerism.8. Apply the principles of enolate ions to coupling reactions of aldehydes and ketones.9. Visualize cyclizations via aldol condensations.
8. To learn to name and know the general physical properties of carboxylic acids.	<ol style="list-style-type: none">1. Know the rules of IUPAC nomenclature of carboxylic acids.2. Understand the polarity and acidity of carboxylic acids through the resonance of the carboxylate anion.
9. To learn to recognize and name the common derivatives of carboxylic acids.	<ol style="list-style-type: none">1. Know the rules of IUPAC nomenclature of esters.2. Know the rules of IUPAC nomenclature of carboxylic anhydrides.

Course Objective	Competencies
10.To learn how carboxylic acids and their derivatives are synthesized.	<ol style="list-style-type: none">3. Know the rules of IUPAC nomenclature of acyl chlorides.4. Know the rules of IUPAC nomenclature of amides.5. Know the rules of IUPAC nomenclature of nitriles. <ol style="list-style-type: none">1. Be familiar with common oxidizing agents that are often used in organic synthesis.2. Be familiar with nucleophilic substitutions at the acyl carbon.3. Understand the relative reactivity of acyl compounds.
11.To know the basic reactions of carboxylic acids and their derivatives.	<ol style="list-style-type: none">1. Be familiar with nucleophilic substitution reactions at the acyl carbon.2. Strong familiarity with the mechanism for acid-promoted hydrolysis.3. Strong familiarity with the mechanism for base-promoted hydrolysis.
12.To recognize the general structure of an amine and be able to name the amine.	<ol style="list-style-type: none">1. Know the rules of IUPAC nomenclature for amines in general.2. Identify an amine as a primary, secondary, tertiary, aryl or heterocyclic.
13.To understand the physical properties of amines.	<ol style="list-style-type: none">1. Know the general structure of the nitrogen atom and the geometry of the amine.2. Understand how an amine acts as a base.3. Recognize the difference in basicity between an alkylamine and an arylamine.

Course Objective	Competencies
14.To learn the common reactions to produce amines.	<ol style="list-style-type: none">1. Relating the principles of nucleophilic substitution to the basicity of amines.2. Relate common reduce agents to reduction of nitro compounds.3. Use reducing agent to reduce amides, oximes and nitriles.
15.To learn the common reactions of amines.	<ol style="list-style-type: none">1. Knowledge of reactions with nitrous acid.2. Ability to recognize primary, secondary, tertiary and arylamines.3. Familiarity with arenediazonium salts.