

CHE 202 Organic Chemistry

Course Information	
Course Code, Number & Name	CHE 202, Organic Chemistry Total Credit hours: 4 Cr. Hrs
Prerequisite/s	CHE 103
Time, Days & Hall	
Instructor	
Office Location	
Office Hours	
E-mail	

Description of the course

First part of a comprehensive survey of the chemistry of carbon compounds: their structure, properties, bonding, stereochemistry, reactions, and reaction mechanisms. the important role of organic chemistry in life, both biological and economical, attack problems in a systematic, logical manner, explain the relationship of chemistry in general and organic in specific to the rest of science.

Required Textbook

Organic chemistry, 8th Edition, Brooks cole : John McMurry, 2011.

Other essential references

- T. W. Graham Solomons Craig B. Fryhle 10th edition.
- <http://www.aceorganicchem.com/organic-chemistry-practice-exams.html>

Topics Outline

Week	Chapter	Topics to be Covered	# Hours
1	Ch1	Atomic Structure: The nucleus. Orbitals, Electron Configurations, Development of chemical bonding theory, Valence BOND Theory, sp ³ , sp ² , sp Hybrid orbitals and the structure of Methane, Ethane, Ethylene and acetylene, The Nature of the chemical bonds, Drawing Chemical Structures. Covalent Bonds: Acids and Bases. Polar Covalent Bonds, Formal Charges, Resonance, Rules of Resonance Forms, Drawing for Resonance Forms, Acids and bases, The Bronsted-Lowry Definition, Acid base Strength, Predicting Acid - base	4
1	Ch 2	Alkanes and Their Stereochemistry: Functional Groups, Alkane and Isomers, Naming Alkanes, Properties of Alkanes, Conformation of Ethane, Conformations of Other Alkane.	4

1	Ch 3	Cycloalkanes and Their Stereochemistry: Naming Cycloalkanes, Cis-Trans Isomerism in Cycloalkanes, Conformations of cycloalkanes, Axial and Equatorial bonds in cycloalkane, Conformational Monosubstituted Cycloalkanes, Conformational Disubstituted Cycloalkanes, Conformations of PolyCyclic cyclohexanes.	4
0.5	Ch 4	An Overview of Organic Reactions, Kinds of organic reactions, How organic reaction occur, Mechanisms, Radical reactions, Polar reaction, Using curved Arrows in polar reactions Mechanisms, Describing a Reaction (Intermediates).	2
Midterm I			
1.5	Ch 5	Alkenes: Structure and Reactivity, Industrial Preparation and Use of Alkenes, Calculating Degree of Unsaturation, Naming Alkenes, Sequence Rules: E, Z Designation Stability of Alkenes, Electrophilic Addition Reactions of Alkenes, Orientation of Electrophilic Additions: Markovnikov's rule, Carbocation Structure and Stability, The Hammond Postulate, Evidence for the Mechanism of ElectroAdditions, Carbocations Rearrangements.	6
1	Ch 6	Reactions and Synthesis; Preparations of alkenes; A Preview of Elimination Reactions, Addition of Halogens to Alkenes, Addition of Hypohalous Acids of Alkenes. Addition of water to alkenes (Oxymercuration, hydroboration), Addition of Carbenes to alkenes, Reduction of Alkenes, Oxidation of Alkenes (Epoxidation, Cleavage to carbonyl Compounds), Radical Additions to Alkenes; Biological Addition of Radicals to alkenes.	4
1	Ch 7	Alkynes: Naming Alkynes, Preparation of alkynes, (Elimination Reactions of Dihalides); Reactions of Alkyne (Addition of HX and X ₂); Hydration of Alkynes); Reduction of Alkynes; Oxidative Cleavage of alkynes: Alkyne Acidity (Formation of Acetylide Anions); Alkylation of Acetylide Anions, An Introduction of Organic Synthesis.	4
1.5	Ch 8	Stereochemistry: Enantiomers and the Tetrahedral Carbon, The Reason for Handedness in Molecules (Chirality Optical Activity) pasteur's discovery of Enantiomers, Sequence Rule for Specifying Configuration, Diastereomers, Meso Compounds, Racemic Mixtures and the Resolution of Enantiomers, Stereochemistry of Reactions: addition of H ₂ O to an Achiral Alkene, Stereochemistry of Reactions: addition of H ₂ O to an a chiral Alkene, Chirality at nitrogen, phosphorus and Sulfur, Chirality in Nature and Chiral Environments.	6
Midterm II			
1	Ch 9	Organohalids, Naming alkyl halides, Structure of Alkylhalides, Preparing of Alkyl Halides from Alkanes (Radical Halogenations), Preparation of Alkylhalides from Alkenes (Allylic Bromination), Stability of the Allyl Radicals, Preparaton of Alkyl Halidse from Alcohols, Reactions of Alkyl Halides (Grignard Reagents), Organometallic Coupling Reactions, Oxidation and Reduction in Organic Chemistry.	4

1	Ch 10	Reactions of Alkyl Halides: The Discovery of Nucleophilic Substitution Reactions, The S_N2 Reaction, Characterisations of the S_N2 Reactions, The S_N1 Reaction, Characterisations of the S_N1 Reactions, Biological Substitution Reactions, Elimination Reactions of Alkyl Halides; Zaitsev's Rule, The E_2 Reaction and the Deuterium isotope Effect, The E_2 Reaction and Cyclohexane Conformation, The E_1 and E_1cB Reactions, Biological Elimination Reactions.	4
1.5	CH11	Alcohols and Phenols: Naming Alcohols, Properties of Alcohols and Phenols: Hydrogen Bonding, Properties of Alcohols and Phenols: Acidity and Basicity, Preparation of Alcohols: an Overview, Alcohols from Reduction of Carbonyl Compounds, Alcohols from Reaction of Carbonyl Compounds with Grignard Reagents, Some Reactions of Alcohols, Oxidation of Alcohols, Protection of Alcohols, Preparation and Uses of Phenols, Reactions of Phenols.	6
1	CH12	Ethers and Epoxides: Thiols and Sulfides: Naming Ethers, Structure, Properties, and Sources of Ethers, The Williamson Ether Synthesis, Alkoxymercuration of Alkenes, Reactions of Ethers: Acidic Cleavage, Reactions of Ethers: Claisen Rearrangement, Cyclic Ethers: Epoxides, Ring-Opening Reactions of Epoxides, Crown Ethers, Thiols and Sulfides.	4
1	CH13	Aldehydes and Ketones: Nucleophilic Addition Reactions: Naming Aldehydes and Ketones, Preparation of Aldehydes and Ketones, Oxidation of Aldehydes and Ketones, Nucleophilic Addition Reactions of Aldehydes and Ketones, Relative Reactivity of Aldehydes and Ketones, Nucleophilic Addition of H_2O : Hydration, Nucleophilic Addition of HCN : Cyanohydrin Formation, Nucleophilic Addition of Amines: Imine and Enamine Formation, Nucleophilic Addition of Hydrazine: The Wolff-Kishner Reaction, Nucleophilic Addition of Alcohols: Acetal Formation.	4
0.5		REVIEW	2

Assessment Methods

Assessment Type	Date	Weight %
First Exam	At the end of the 6th week	20%
Second Exam	At the end of the 11th week	20%
Home works & Quizzes,	Are due one week from assignment time	10%
project	At the end of the 12 th week	10%
Final Exam	At the end of the semester as per the university schedule	40%
Total		100%