OUTCOMES BASED LEARNING MATRIX

Course Description: This is a study of the main classes of organic compounds including an introduction to natural products. The nomenclature, reaction mechanisms, synthesis, and general properties of alkanes, alkenes, alkynes, alcohols, and haloalkanes are discussed. The topics of stereochemistry, nucleophilic substitution, elimination, and radical chain reactions are discussed. The laboratory is both preparative and analytical using classical and instrumental experimental techniques. Lecture: 3 hours Laboratory: 4 hours Prerequisite: General Chemistry II (CHEM152) or Permission of Instructor

Course: Organic Chemistry I Department: Physical Science Revised: Fall 2009

At the end of the course, students will be able to: | **Students will participate in:** | **Faculty will evaluate:**

COURSE OUTCOMES	OUTCOME ACTIVITIES	Assessment Tools
Review of Covalent Bonding: -describe and understand covalent bonding concepts including the octet rule, Lewis Structures, polar bonding, hybridization and VSEPR Theory. -predict the formulas for the various organic functional groups. -determine polarity of a molecules	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. (CT, R, QS, TS) -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)
Hydrocarbons: -draw and name alkanes and cycloalkanes. -demonstrate with models conformations of alkanes and cycloalkanes.	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)

-relate structure to physical properties of alkanes and cycloalkanes. -show with models *cis-trans* isomerism of cycloalkanes. -discuss the physical properties	-experiments during laboratory sessions. (CT, R, QS, TS) -organizing and documenting information in lab reports. (CT, W, QS)	
Chirality and Stereochemistry: -draw and construct using models examples of constitutional, conformational and *cis-trans* isomers. -draw Fischer Projections. -name isomers using the R-S system. -show via reactions how chiral molecules can be separated.	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. (CT, R, QS, TS) -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)
Acids and Bases: -identify organic compounds as acids or bases based on the Arrhenius, Bronsted-Lowry, and Lewis systems. -illustrate how chemical structure, hybridization, resonance and inductive effects affects acidity. -discuss factors that determine acid strength	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. (CT, R, QS, TS) -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)

Haloalkanes: -draw and name common alkyl halides. -relate the chemical structure to the physical properties of these compounds. -show the mechanism of the halogenation of alkanes. -explain nucleophilic substitution and show a possible mechanism	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. (CT, R, QS, TS) -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)
Nucleophylic Substitution and β-Elimination: -show the mechanisms of S_N1, S_N2, E1 and E2 reactions. -show the effects of stereochemistry, alkyl halide structure, solvents and kinetics on which mechanism predominates. -explain Zaitsev's rule as it relates to the reaction products	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. (CT, R, QS, TS) -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)
Alcohols: -draw and name the common alcohols and glycols. -show how the structure of these compounds is related to their properties. -show the reaction of alcohols with active metals, HX compounds, PBr_3 and $SOCl_2$. -show the mechanism for the dehydration of primary, secondary and tertiary alcohols. -show how carbocation rearrangements effects the product of a reaction -show the mechanism for the Pinacol Rearangement.	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. (CT, R, QS, TS) -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)

-show the reactions for the oxidation of alcohols.		
Alkenes : -draw and name alkenes and cycloalkenes. -illustrate how the chemical structure is related to the properties of these compounds. -illustrate with specific reactions principal addition reactions of alkenes: addition of HX, addition of X_2, addition of HOX, addition of H_2O and addition of H_2. -illustrate the Hydroboration-Oxidation, Glycol Oxidation and Ozone Oxidation of alkenes.	- lectures, discussions, and demonstrations. (CT, QS, OC) -reading the text, including sample problems. (CT, R, QS) -solving assigned problems. (CT, R, QS) -experiments during laboratory sessions. (CT, R, QS, TS) -organizing and documenting information in lab reports. (CT, W, QS)	-Tests with emphasis on solving problems (CT, W, R, QS) -Lab performance (CT, QS, TS, R, OC) -Lab reports (W, QS, CT)