**Department of Chemistry Syllabus**

This syllabi is advisory only. For details on a particular instructor's syllabus (including books), consult the instructor's course page. For a list of what courses are being taught each quarter, refer to the Courses page. *Every instructor has prerogative to teach the course as they see fit and ultimately the instructor's syllabus supersedes all others.*

***CHE 118A: Organic Chemistry for Health and Life Sciences***

Approved:

Suggested Textbook: (actual textbook varies by instructor; check your instructor)

“Organic Chemistry, 7th Edition”, K.P.C. Vollhardt & N.Schore

 “Study Guide/ Solution Manual, 7th Ed.”

“Chemistry 118A Discussion Manual”

Molecular Models

Suggested Lecture Schedule:

Week 1 Introduction and Initial Assessment

 Bonding, Orbitals and Hybridization

 Structures of Alkanes

Week 2 Conformers and Rotation

 Acids, Bases, and pKa’s

 Introduction to Radicals

Week 3 Halogenation of Alkanes

 Selectivity of Halogenation

Week 4 Cycloalkanes

 Ring Strain

 Midterm 1

Week 5 Polycyclics

 Chirality and Stereoisomers

 Multiple Stereocenters: Diastereomers and Meso Compounds

Week 6 Chiral Reactions

 Haloalkanes

 Nucleophilic Substitution (SN2)

Week 7 Rates of SN2

 Nucleophilic Substitution (SN1)

 Elimiation (E1 and E2)

Week 8 Choosing the Predominant Mechanism

Properties of Alcohols

 Midterm 2

Week 9 Reactions of Alcohols

 Synthesis of Alcohols

 Organometallics and Synthetic Strategy

Week 10 pKa’s of Alcohols

 Reactions of Ethers

 Oxacyclopropanes

Suggested Discussion Schedule:

Week 1 Structure of Organic Molecules I (Chap 1.3-5, 1.9)

 Drawing Structures of Organic Molecules

 Resonance

Week 2 Structure of Organic Molecules II (Chap. 1.8, 2.7-8)

 Hybridization Conformations of Alkanes and Cycloalkanes

Week 3 Nomenclature (Chap. 2.4-2.5)

 Compound Classes and Functional Groups

 Naming Alkanes and Haloalkanes

Week 4 Stereoisomerism (Chap. 5)

 Three-Dimensional Shapes of Molecules

Week 5 Spectroscopy I (Chap. 11.5)

 Infrared Spectroscopy

Week 6 Spectroscopy II (Chap. 10.1-6)

 Nuclear Magnetic Resonance

 Chemical Equivalence and Chemical Shifts

Week 7 Spectroscopy III (Chap. 10.6-8 NMR Handout)

Nuclear Magnetic Resonance

 Integration and Coupling

Week 8 Spectroscopy III (Chap. 10.5 – 10.6, NMR Handout)

 Approaching Spectroscopy Problem Solving

Week 9 Synthesis (Chap. 8.9)

 Approaching Synthetic Problem Solving

Additional Notes:

Prerequisites: CHE-2C with a C- or better.

Learning Goals:

Upon completion of this course students should be able to:

Identify Lewis acids and bases, nucleophiles and electrophiles, and oxidizing and reducing agents.

Name linear, cyclic, and branched alkanes, haloalkanes, alcohols, and ethers using IUPAC nomenclature and recognize the common names of everyday molecules.

Draw organic molecules using condensed formula, Kekule structures, zig-zag, or bond-line structures.

Describe how resonance pertains to organic molecules and be able to draw resonance structures.

Explain the strain and stability of carbocations and cycloalkanes.

Understand and explain the mechanism and energetics of radical chain halogenation of alkanes, the predicted products and product ratios, and why those products form.

Understand the three dimensional structure of organic molecules and identify achiral molecules, enantiomers, diastereomers, and meso molecules. Be able to identify chiral centers and label their configurations.

Explain the mechanisms of SN2. SN1, E1 and E2 reactions of haloalkanes and predict which mechanism will occur under given conditions using principles of substrate reactivity, nucleophilicity, and leaving group stability.

Understand and explain the reactions of alcohols and ethers including determining the products of reaction, reagents used in reactions and mechanisms.

Understand and explain the principles behind infrared spectroscopy including wavenumber ranges of common bonds and interpretation of spectra.

Understand and explain the principles behind 1H NMR spectroscopy including chemical shift ranges of common functional groups, integration of NMR peaks and coupling of neighboring hydrogen, interpretation of spectra and with given formula and or IR identification of unknown molecules.

Integrate reactions of alkanes, haloalkanes, alcohols, and ethers into multistep synthesis of target compounds from given starting materials.