**List of Topics to Study**

**Structure and Bonding**

 **Lewis structures, molecular orbitals, hybridization**

**Nomenclature of organic compounds (mostly IUPAC)**

**Conformations of organic molecules**

**Stereoisomerism and Chirality**

 **Fischer projections, cis-trans isomers, E/Z isomers, enantiomers, meso compounds,**

 **Diastereomers, absolute configuration (R/S), relative configuration (D/L)**

**Resonance and Electron Delocalization**

**Acids and Bases**

 **Strength of acids/bases (pKa), inductive vs. size vs. resonance effects**

**Addition reactions**

 **Addition of HX, Markovnikov's rule, halogenation, hydrogenation, oxymercuration and**

 **Hydroboration of alkenes/alkynes, Diels-Alder reaction**

**Elimination reactions**

 **E1 vs. E2, Saytzeff's rule, E1cb elimination, Hofmann elimination**

**Substitution reactions**

 **Sn1/Sn2, leaving group ability, nucleophilicity, solvent effects,**

 **Conversion of alcohols to leaving groups**

**Carbocation rearrangements**

**Infrared Spectroscopy (IR)**

 **Modes of vibration, vibration frequency of common functional groups**

**Nuclear Magnetic Resonance Spectroscopy (NMR)**

 **Chemical shift and equivalence, spin-spin splitting**

**Oxidation and Reduction reactions and reagents**

**Organometallic reagents**

 **Alkyllithiums, Grignard reagents, cuprates**

**Carbonyl chemistry**

 **Aldehydes and Ketones (preparation, nucleophilic addition to C=O), carboxylic acids**

 **Acid derivatives and their inter conversions, substitution next to C=O, enolates**

 **Condensation reactions**

**Aromatic Substitution Reactions**

 **Electrophilic aromatic substitution (EAS), activating/deactivating substituents**

 **Direction effects**