**Organic Chemistry for Medical Students–Syllabus**

**In the second half of semester A - eight hours a week**

**Sackler faculty of medicine**

**Tel-Aviv University-Israel**

**Organic Chemistry:**

 **Organic Compounds and Alkanes**

**Alkane Structure, double bond equivalent, alkyl group, Nomenclature (IUPAC rules), intermolecular forces (van der Waals force, Dipole–dipole interaction, Hydrogen bonds), Solubility, Conformations of alkanes(staggered-eclipsd) , Cycloalkanes, geometric isomers, The chair conformation of cyclohexane, Combustion of alkanes, Oxidation and Reduction in Organic Chemistry, Halogenation of alkanes.**

**Stereochemistry**

**Classification of Isomers, Chirality, Enantiomers, Achiral molecules, chirality center, Meso compounds, Naming Enantiomers ( R,S configurations), Fischer Projection, Optical Activity, Racemic Mixture, Diastereomers, Resolution of a Racemic Mixture, Discrimination of Enantiomers by Biological Molecules.**

**Substitution and Elimination reactions**

**substitution and elimination reactions- definitions, Mechanism of an SN2 Reaction, Nucleophilicity, Mechanism of an SN1 Reaction, rearrangement, Mechanism of an E1 and E2 Reactions, SN2- SN1 conditions, Competition Between Substitution and Elimination.**

**Alcohols and Ethers**

**Dehydration of Alcohols, Alcohol oxidation, Acid catalyzed ring-opening of epoxides.**

**Alkenes and Alkynes**

**Nomenclature, Structure and Properties, Addition of Hydrogen Halides, Markovnikov’s Rule, Addition of Water, addition of A Peroxyacids to an Alkene, Hydroboration,** **anti-Markovnikov addition of HBr, Addition of Hydrogen, Relative Stabilities of Alkenes.**

**Alkynes: Nomenclature, Structure and Properties, Addition of Water to Alkynes, Reduction of alkyne, alkylation.**

**Carboxylic acid derivatives**

**Nomenclature, Structure and Properties, Addition-Elimination Mechanism, Reactions of Acyl Halides, Reactions of Acid Anhydrides, Reactions of Esters, Ester Hydrolysis, Fischer esterification, reaction of amides and carboxylic acids, Hydrolysis of Nitriles, Activation of Carboxylic Acids, Dicarboxylic Acids, reduction of esters, carboxylic acids, acyl halides, amides and nitriles.**

**Aldehydes and Ketones +** **Reactions at the α-Carbon**

**Nomenclature, Structure and Properties, Reactions of Aldehydes and Ketones with Grignard Reagents, cyanide ion, acetylide ion, hydride and Nitrogen Nucleophiles, Reductive amination, Formation of enamine, Reactions of enamines. Reduction of ketones to alkanes, Reactions of Aldehydes and Ketones with water and Alcohols.**

**Reactions at the α-Carbon: Acidity of α –Hydrogens, Keto–Enol Tautomerism, Halogenation of the α -Carbon of Aldehydes and Ketones, Enolization, Alkylation of the α -Carbon of Carbonyl Compounds, The Michael Reaction, aldol condensation, Claisen Condensation, Dieckmann condensation, Decarboxylation, The Malonic Ester Synthesis, The Acetoacetic Ester Synthesis,**

 **Aromatic compounds**

**Aromaticity, Pi-Stacking, Nomenclature, Properties, ortho meta and para positions.**

**Spectral methods useful for medicine: NirIR spectroscopy, UV, NMR principles, MRI and relaxation time, Mass spectrometry.**

**Fundamentals of Biochemistry (Briefly):**

**Amino acids and their effect on protein structure and function, and their contribution in enzymatic catalysis at the active site, the building blocks of carbohydrates, nucleotides and nucleic acids, lipids (fatty acids, steroid triglycerides, etc.), metabolic pathways, drugs.**

**Bibliography:**

1. Organic chemistry,P. Bruice.
2. Organic Chemistry, J.E. McMurry.

**Dr. Haj Yahya Anan**