

Bioorganic Chemistry
Academic plan of lectures for students of FS faculty
II semester of 2017-2018 st. year

1. Introduction. Goals and objectives of Bioorganic Chemistry in medical education. The influence of atoms & ways of its transfer in organic molecules. Conjugation. Aromaticity. Electronic effects.
2. Classification and mechanisms of organic reactions. Fundamentals of organic compounds reactivity. Homolytic (free radical) and heterolytic (ionic) reactions. Reactions of free radical substitution (SR) & electrophilic addition (AE) of saturated and unsaturated hydrocarbons. Reactions of electrophilic substitution (SE) of aromatic hydrocarbons.
3. Acid-base properties of organic compounds, ionization. The role of ionization in realization of biological activity. Concurrent reactions of nucleophilic substitution (S_{N1} & S_{N2}) and elimination (E_1 & E_2) on saturated carbon atom (Alcohols and Halogen substituted hydrocarbons).
4. Nucleophilic addition reactions (A_N) on sp^2 -hybridized carbon atoms of biologically important carbonyl compounds. Oxidation and reduction of organic compounds. Antioxidants.
5. Nucleophilic substitution reactions (S_N) of carboxylic acids. Higher fatty acids, structure, nomenclature, properties. Esters, thioesters, their biological role.
6. Lipids, classification, individual representatives. Phospholipids as structural components of biological membranes. Lipids peroxidation.
7. Poly- & hetero-functionality as a base for the formation of specific properties of hydroxyl-, amino- and keto- acids. Tautomerism. Physiologically active benzene related compounds.
8. Biologically active heterocyclic compounds. Alkaloids. Individual representatives of natural and synthetic biologically-active heterocycles.
9. Stereochemistry of organic compounds. Enantiomers & diastereomers. The role of stereochemical concepts for understanding of interaction specificity at the molecular level.
10. Carbohydrates, structure, properties and role in life processes. Olygo- and polysaccharides.
11. Amino acids and peptides. Structure, properties and biological role. The strategy of artificial peptides synthesis. Proteins. Methods of primary structure determining for peptides and proteins.
12. Nucleotides and nucleic acids. The structure and biological functions. Mutagenic and carcinogenic effects of radionuclides, UV radiation and certain chemicals.

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