**Chemistry in medicine**

**SCHEDULE OF LECTURES AND SEMINARS, IN ACADEMIC 2024/2025**

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| **Week** | **Lecture (3 classes), THURSDAY,**  **8-10:30** | **Seminar (2 classes), 1st and 2nd group**  **WEDNESDAY,**  **Institute 15:00-16:30** |
| **I** | **Tuesday, 1.10. 16-18, Institute of Physiology & Histology, Ground floor, Biochemical Labs I and II**  **L-1.** Water. The structure of water. Intra and intermolecular bonds. Covalent bond. Non-covalent interactions. The structure of biomolecules as a consequence of interaction with water. Aqueous solutions: solutions and colloids. | **S-1***.* Concentrations of solutions: mass, molar, molal; ion concentrations; osmolarity of the solution. Calculations. |
| **II** | **Monday, 7.10. 16-18, Institute of Physiology & Histology, Ground floor, Biochemical Labs I and II**  **L-2**. Thermodynamic changes during chemical reactions in living systems. Chemical kinetics. Factors affecting the rate of reaction. Transition state, activation energy. Chemical equilibrium, equilibrium constant.  **Thursday, 10.10., Main building 8-10:30**  **L-3**. Electrolytes. Theories of acids and bases. Dissociation constant of acids and bases. Acid-base equilibrium. Amphoteric electrolytes. Ionic product of water, pH. Neutralization, salts, types of salts. Salt hydrolysis. Solubility product. | **S-2**. Energetics: enthalpy, entropy, free energy of biomolecules. Spontaneity of reactions.  Kinetics of biologically important chemical reactions. Calculations. |
| **III** | **Thursday, 17.10. Main building 8-10:30**  **L-4**. Structure and classification of organic molecules. Double bond reactivity, geometric isomerism. Aromatic and heterocyclic compounds. Resonance of aromatic compounds. | **S-3**.Equilibrium in aqueous solutions.Calculations. |
| **IV** | **Thursday, 24.10. Main building 8-10:30**  **L-5.** Reactivity of the hydroxy group in alcohols and phenols. Sulfhydryl group. Carbonyl group in aldehydes and ketones. Amines, aminoalcohols and biogenic amines. | **S-4.** Structure and isomerism of organic compounds. Repetition of general chemistry. |
| **V** | **Thursday, 31.10. Main building 8-10:30**  **L-6.** Carboxylic acids. Derivatives of carboxylic acids. Derivatives of carbonic acid. Redox reactions of organic and biomolecules. Standard and biological redox potentials. Free radicals and antioxidants. | **S-5.** Reactivity of biologically important functional groups. |
| **VI** | **Thursday, 7.11. Main building 8-10:30**  **L-7**. Chemical reactions of amino acids. Peptide bond. Biologically important peptides. Structural levels: primary, secondary, tertiary and quaternary. Domains. | **S-6.** Structure, stereochemistry and reactivity of biologically important substituted acids (hydroxy, oxo). |
| **VII** | **Thursday, 14.11. Main building 8-10:30**  **L-8**. Protein-ligand interactions. Biomolecules as catalysts. Basics of proteomics technology. Carbohydrates. Stereochemistry and reactivity of monosaccharides. Reducing and non-reducing disaccharides. Polysaccharides. | **S-7.** Conformational *in* *vivo* and *in vitro* changes of proteins (denaturation, renaturation). Complex proteins. |
| **VIII** | **Thursday, 21.11. Main building 8-10:30**  **L-9**. Structure and properties of purine and pyrimidine bases, nucleosides and nucleotides. Structure and properties of nucleic acids (RNA and DNA). Fatty acids. Structure and properties of simple and complex lipids. | **S-8.** Medically important reactions of carbohydrates. Glycoproteins and glucosaminoglucans in medicine. |
| **IX** | **/** | **S-9.** Glycero and sphingophospholipids; structure of membranes. Sterols, steroids, bile acids, hormones, vitamins. |