

Level: bachelor				
Course title: Fundamentals of Biochemistry				
Status: obligatory				
ECTS: 9				
Requirements: none				
Learning objectives (1) To introduce students to fundamental concepts of biochemistry necessary for higher biochemistry courses and understanding of biochemistry-related fields, (2) to provide students with critical understanding of the relationship between biological activity and biomolecules structure, (3) to develop practical skills and ability to apply standard and basic biochemical experimental methods in solving biochemical problems.				
Learning outcomes (1) demonstrate basic knowledge of chemical principles underlying biochemical processes, and to explain characteristics of biochemical reactions and living matter, (2) describe structure, chemical properties and biological functions of main groups of biomolecules (carbohydrates, proteins, lipids, nucleotides), and demonstrate the relationship between three-dimensional structure and biological functions of biomolecules, (3) demonstrate basic understanding of enzyme catalysis mechanisms, importance of enzymes for living systems, and kinetics and thermodynamics of enzyme-catalyzed reactions, (4) explain the function of main metabolic processes in cells, and conversion of dietary biomolecules into metabolic fuels, (5) search biochemical references (books, journals, internet resources) and independently write basic texts on selected biochemical topics, (6) apply chemical and biochemical experimental methods in solving practical biochemical problems, and interpret experimental results.				
Syllabus <i>Theoretical instruction</i> Molecular logic of life: concept, characteristics and origin of living matter. Main classes of biomolecules. Amino acids structure and properties. Peptides, peptide bond properties, biologically active peptides. Proteins. Primary structure, sequencing. Protein 3D structure: secondary and tertiary. Tertiary structure stabilizing interactions. Globular and fibrillar proteins. Quaternary structure. Allosteric regulation of oligomeric proteins, hemoglobin as allosteric protein. Carbohydrates: structure, classification, function. Biologically active monosaccharides. Oligosaccharides. Polysaccharides, glycosaminoglycans. Glycoproteins, proteoglycans, peptidoglycans. Lipids: classification, structure and function of saponifiable and non-saponifiable lipids. Biological membranes, membrane proteins, membrane transport. Nucleobases, nucleosides, nucleotides, nucleic acids (DNA, RNA). Introduction to enzymes. Main properties, classification and nomenclature of enzymes. Coenzymes, classification, mechanism of action, water-soluble vitamins. Introduction to metabolism. Concepts of catabolism and anabolism. Fundamental bioenergetics, energy-rich compounds. Main energy metabolism pathways: glycolysis, fatty acid oxidation, Krebs cycle, electron transport chain and oxidative phosphorylation. <i>Practical instruction</i> Laboratory exercises follow the theoretical instructions, and include tests for identification of biomolecules, their quantification, and some basic biochemical techniques.				
Weekly teaching load				Other:
Lectures: 3	Exercises: 4	Other forms of teaching: 1	Student research:	