



**INSTITUTIA PUBLICĂ
UNIVERSITATEA DE STAT DE MEDICINĂ SI FARMACIE
"NICOLAE TESTEMITANU" DIN REPUBLICA MOLDOVA**

Pag /

Approved
at the Department of biochemistry and clinical biochemistry
meeting from 24.08.2020 protocol Nr. 1
Chief of the Department, MD, Ph.D., assoc. prof.
_____ Silvia Stratulat

**Syllabus of lectures and practical classes in Structural biochemistry
for students of Medicine II, academic year 2020-2021**

Fall semester (1) – first year

N	Date	Topic of lectures	Topic of practical classes
1	07-11.09	Bioelements and biomolecules. Functional groups and types of chemical bonds specific for biomolecules. Water. The structure and physical properties of the water. Ionization of water. Definition of pH. Biological buffers. Henderson-Hasselbach equation.	
2	14-18.09	Amino acids - classification and structure. Acid-base properties of amino acids. The isoelectric state and isoelectric point. The reactions of biological importance of a-amino acids. The primary structure of the protein. The properties of the peptide bond. Methods for determining the composition and amino acid sequence in the polypeptide chain.	Introduction. The importance of biochemistry for medical disciplines. Bioelements and biomolecules. Functional groups and types of chemical bonds specific for biomolecules.
3	21-25.09	Proteins - the biomedical role, levels of organization, classification. Secondary, tertiary and quaternary structure of proteins. Simple and conjugated proteins. Fibrillar proteins: collagen and elastin. Ca ²⁺ -binding proteins. The physico-chemical properties of proteins. The methods of separation, purification and analysis of proteins.	Water. The structure and physical properties of the water. Ionization of water. Definition of pH. Biological buffers. Henderson-Hasselbach equation.



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Pag /

4	28.09-02.10	Nucleic acids - classification and biomedical role. Nitrogenous bases, nucleosides and nucleotides - the structure and nomenclature. Natural nucleotide derivatives – the structure and biomedical importance. Primary and secondary structure of nucleic acids. Higher levels of DNA and RNA compaction.	Amino acids - classification and structure. Acid-base properties of amino acids. The isoelectric state and isoelectric point. The reactions of biological importance of α -amino acids. The primary structure of the protein. The properties of the peptide bond. Methods for determining the composition and amino acid sequence in the polypeptide chain.
5	05-09.10	Carbohydrates. Classification of carbohydrates. Monosaccharides. Aldose and ketosis. The structure isomerism and properties of monosaccharides. Biomedical importance. Aminosugars. Oligosaccharides and polysaccharides. Disaccharides (maltose, lactose, sucrose), homopolysaccharides (starch, glycogen, cellulose) and heteropolysaccharides (hyaluronic acid, heparin)- structure, properties and biomedical role.	Proteins - the biomedical role, levels of organization, classification. Secondary, tertiary and quaternary structure of proteins. Simple and conjugated proteins. Fibrillar proteins: collagen and elastin. Ca^{2+} -binding proteins.
6	12-16.10	Water-soluble vitamins. The structure of vitamins B ₁ , B ₂ , B ₆ , PP, pantothenic acid, biotin, folic acid, vitamin C and B ₁₂ and their role as co-enzymes.	The physico-chemical properties of proteins. The methods of separation, purification and analysis of proteins.
7	19-23.10	Lipids. Saturated and unsaturated fatty acids. Triacylglycerols and glycerophospholipids. Sphingolipids. Sphingomyelins and glycolipids. Classification, structure, physico-chemical properties, biological role.	Concluding test I: "General Chemistry. Amino acids. Proteins."
8	26-30.10	Steroids. Cholesterol and its derivatives - steroid hormones (gestagens, corticosteroids, androgens, estrogens), bile acids. Fat-soluble vitamins. Vitamin D - structure, synthesis, biological role. Vitamins A, E, K - structure, biological role.	Nucleic acids - classification and biomedical role. Nitrogenous bases, nucleosides and nucleotides - the structure and nomenclature. Natural nucleotide derivatives –the structure and biomedical importance. Primary and secondary structure of nucleic acids. Higher levels of DNA and RNA compaction.
9	02-06.11	Biological membranes. Chemical composition, structural and functional organization, properties and functions. Membrane transport.	Carbohydrates. Classification of carbohydrates. Monosaccharides. Aldoses and ketoses. The structure isomerism and properties of monosaccharides. Biomedical importance. Aminosugars.



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Pag /

10	09-13.11		Oligosaccharides and polysaccharides. Disaccharides (maltose, lactose, sucrose), homopolysaccharides (starch, glycogen, cellulose) and heteropolysaccharides (hyaluronic acid, heparin)- structure, properties and biomedical role. Water-soluble vitamins. The structure of vitamins B ₁ , B ₂ , B ₆ , PP, pantothenic acid, biotin, folic acid, vitamin C and B ₁₂ and their role as co-enzymes.
11	16-20.11		Concluding test II: "Nucleic acids. Carbohydrates. Water-soluble vitamins."
12	23-27.11		Lipids. Saturated and unsaturated fatty acids. Triacylglycerols and glycerophospholipids. Sphingolipids. Sphingomyelins and glycolipids. Classification, structure, physico-chemical properties, biological role.
13	30.11-04.12		Steroids. Cholesterol and its derivatives - steroid hormones (gestagens, corticosteroids, androgens, estrogens), bile acids. Fat-soluble vitamins. Vitamin D - structure, synthesis, biological role. Vitamins A, E, K - structure, biological role.
14	07-11.12		Biological membranes. Chemical composition, structural and functional organization, properties and functions. Membrane transport.
15	14-18.12		Concluding test III: "Lipids. Biological membranes"
16	21-24.12		Admission to the exam

N O T I C E: Duration of lectures – 1 hour, of practical classes – 2 hours.