Time-schedule of lectures on biochemistry for «English medium» students
Fall semester 2022-2023

№	Date	Topic
1	20.09*	Biochemistry as a science. Proteins as biopolymers. Structure of proteins. Primary, secondary, tertiary and quaternary structure. Supramolecular complexes.
2	27.09	Physico-chemical, chemical and biological properties of proteins.
3	04.10	Enzymes, their biological role. Classification and nomenclature of enzymes. Chemical nature of enzymes. Structure and functional sites of enzymes.
4	11.10*	Mechanism of action of enzymes. Properties of enzymes. Mechanisms of enzymatic activity regulation.
5	25.10	Introduction to metabolism. Laws of thermodinamics. Macroergic compounds. Catabolism of nutrients. Biological oxidation. Krebs cycle.
6	01.11*	Electron transporting chain (ETC). Oxidative phosphorylation. Mechanism of ATP synthesis. Uncoupling mechanism.
7	08.11*	Carbohydrates: definition, classification, functions. Digestion and absorption of carbohydrates. Glucose pool. Synthesis and breakdown of glycogen in liver, regulation.
8	15.11	Oxidative breakdown of glucose. Breakdown of fructose and galactose. Gluconeogenesis, its regulation.
9	22.11	Lipids: definition, classification, functions. Digestion and absorption of lipids. Transport of exogenous lipids in blood.

Lectures are given on TUE (lecture hall №2408)
* Lecture is given im Moodle

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Time-table of practical classes on biochemistry for students of ENGLISH MEDIUM program.
Biomedical chemistry department. Fall semester 2022/2023 year.

Week №	Dates	Topic	Questions for discussion in class, laboratory works
1	03-07.10	Proteins as biopolymers	1) Proteins: definition of class. 2) Biological functions of proteins. 3) Classification of proteins. 4) Aminoacid composition of proteins. 5) Physico-chemical and chemical properties of aminoacids.
2	10-14.10	Proteins structure and physico-chemical properties.	1. Polypeptide theory of protein structure. 2. Conformation and configuration of polypeptide chain. 3. Levels of structural organisation of proteins: primary, secondary, tertiary and quaternary structure. 4. Native conformation and functional sites of protein molecules. 5. Supramolecular protein complexes. 6. Physico-chemical properties of proteins.
3	17-21.10	Chemical and biologycal properties of proteins. Protein- ligand interactions. Final test	1. Chemical properties of proteins (colour reactions, hydrolysis, phosphorylation, glycosylation, gamma-carboxylation, methylation), biological significance. 2. Protein-ligand interaction as a basis for biological functions of proteins. 3. LAB: Determination of protein concentration in serum by a) refractometry and 2) biuret method.
4	24.10-28.10	Vitamins. The biological role of vitamins.	1. Vitamins: definition and classification. 2. Fat-soluble vitamins, functions. 3. Water-soluble vitamins, functions. 4. Antivitamins, mechanism of action. 5. Vitamin disbalance: hypovitaminosis, avitaminosis and hypervitaminosis. 6. LAB: Determination of Vit C concentration in food (fruits and vegetables) and urine.
5	31-03.11, 11.11*	Enzymes: structure, properties, biological role.	1. Enzymes: definition and biological role. 2. Common features and difference of enzymes and non-biological catalysts. 3. Chemical nature of enzymes. Simple and complex enzymes. 4. Cofactors: classification and role in the catalysis. 5. Functional sites of enzymes (active, regulatory, contact platforms). 6. Main properties of enzymes: high catalytical activity, specificity of action, dependence of their activity on enzyme and substrate concentration, temperature, pH. 7. Lab: properties of enzymes.
6	07-10.11, 18.11*	Enzymes: mechanism of action, regulation of activity. Medical enzymology. Final test	1. Mechanism of enzyme action (steps of catalysis, thermodynamic parameters, substrate modification in the active site, etc.). 2. Regulation of enzymatic activity: purpose. Fast and slow mechanisms. 3. Main variants of fast regulatory mechanisms: allosteric modulation, covalent modification, protein-protein interaction, activation of proenzymes, competitive inhibition. 4. Medical enzymology: enzyme pathology, enzyme diagnostics, enzyme therapy. 5. MCQ test on topic "Proteins: structure, properties and functions. Vitamins and enzymes"

7	14-17.11, 25.11*	Energy metabolism. Catabolism. Biological oxidation.	1. Laws of thermodynamics. 2. Exergonic and endergonic reactions. 3. Macroergic compounds. 4. Catabolism of nutrients. 5. Biological oxidation: types of oxidative reactions, enzymes, functions. 6. Lab: determination of ATP in muscles.
8	21-24.11, 02.12*	Mitochondrial oxidation.	1. Krebs cycle: general description, reactions, regulation, biological role, energy balance. 2. Electron transporting chain: structural organisation, description of its work. 3. Redox potential difference as driving force for electron transfer. Energy balance for oxidation of NADH or $FADH_2$. 4. Oxidative phosphorylation as mechanism of ATP production. 5. ETC inhibitors. 6. Uncoupling mechanism.
9	28.11-01.12, 09.12*	Hypoenergetical states. Microsomal oxidation. Reactive oxygen species. Final test	1. Hypoenergetical states. Their origin. 2. Microsomal oxidation. Mono- and dioxygenase reactions. Cytochrome P450. Functions of microsomal oxidation. 3. Reactive oxygen species (ROS). Mechanism of synthesis, their action in normal and pathological conditions, inactivation (enzymatic and non- enzymatic ways).
10	05-08.12, 16.12*	Carbohydrates structure, functions, digestion and absorbtion. Glycogen metabolism.	1. Carbohydrates: definition, classification, functions. 2. Digestion of food carbohydrates: enzymes, products. 3. Absorbtion of monosaccharids in the intestinal wall. 4. Pool of glucose in the body. 5. Glycogen metabolism (synthesis and breakdown) in the liver, its regulation by hormons. 6. Lab: Determination of amylase activity in saliva.
11	12-15.12, 23.12*	Metabolic pathways of intracellular carbohydrates exchange.	1. Dichotomic oxidation of glucose in aerobic and anaerobic conditions, energy balance, biological significance of these processes. 2. Oxidation of galactose and fructose. 3. Conversion of glucose to derivatives of glucuronic acid. 4. Pentosephosphate pathway of glucose oxidation: reactions of oxidative step, biological significance of the process. 5. Gluconeogenesis: reactions, function, regulation. LAB: Determination of glucose concentration in blood by glucose oxidase test.
12	19-22.12, 30.12*	Regulation of carbohydrate exchange. Diseases. Final test	1. Hormons with hypo- or hyperglycemic effect (insulin, glucagon, adrenalin, cortisol, STH, thyroxin). Mechanisms of their influence on glucose concentration in blood. 2. Primary (lactase deficiency, galactosemia [African and Swiss variants], fructose intolerance and essential fructosuria, glycogen exchange diseases) and secondary (diabetes mellitus) diseases caused by (or resulted from) abnormal metabolism of carbohydrates. 3. Methods of carbohydrates exchange investigation. 4. MCQ test on topic "Energy metabolism. Carbohydrates: structure, functions and metabolism"

* for groups on Friday

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