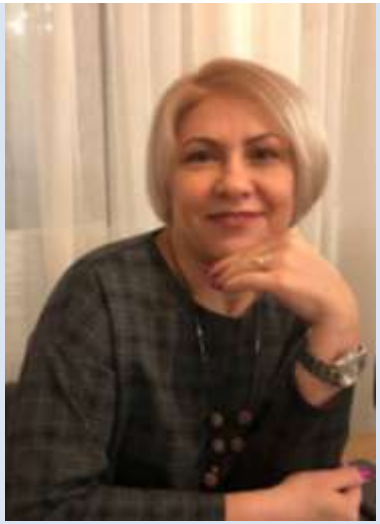
SILABUS OF THE EDUCATIONAL COMPONENT

ANIMAL BIOCHEMISTRY

Specialty	**H6 Veterinary medicine**	**Compulsory nature of the discipline**	**mandatory**
Educational program	**veterinary medicine**	**Faculty**	**Veterinary medicine**
Educational level	**second (master's) level based on the degree program "Junior Specialist"**	**Department**	**Physiology and Biochemistry of Animal**

TEACHER

Nataliia Hladka



Higher education – specialty: veterinary medicine
Scientific degree - Candidate of Agricultural Sciences in specialty 03.00.04 - Biochemistry
Academic title - Associate Professor
Work experience – more than 20 years
Indicators of professional activity on the course topic:

- author of more than 10 methodological developments;
- 20 years of experience in scientific work;
- co-author of a workshop on biological chemistry;
- co-author of more than 15 thematic publications;
- participant in scientific and methodological conferences.

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The following are involved in teaching the discipline: Associate Professor, Candidate of Agricultural Sciences Prykhodchenko Vita Oleksandrivna.

GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT (DISCIPLINE)

Goal	formation of modern ideas among students about the chemical foundations of life, based on knowledge of the chemical structure and properties of the main classes of biomolecules and their derivatives, the main pathways and mechanisms of metabolism and energy, the features of the regulation and integration of metabolic processes, biochemical mechanisms of preservation, transmission and implementation of genetic information.
Format	lectures, laboratory and practical classes, independent work, individual assignments (abstracts).
Detailing of learning outcomes and forms of their control	• Be able to solve complex tasks and problems that arise in professional activities (GC1, GC2, PC2)/ individual practica classes. • Ability to select, pack, fix and send samples of biological material for laboratory research, organize and conduct laboratory and special diagnostic studies and analyze their results (GC3, GC2, PC6, PC7, PC8)/ individual practical classes. • Ability to conduct research at the appropriate level, learn and master modern knowledge (GC7, GC8)/ individual practical classes. • The ability to think abstractly, analyze, synthesize, search, and process information from various sources (GC1, PLO3) / individual practical classes.
Scope and forms of control	7 ECTS credits (210 hours): 18 hours of lectures, 58 hours of laboratory and practical work, 134 hours of independent study; current control (4 sections); final control - exam.
Teacher requirements	timely completion of tasks, activity, teamwork.
Enrollment conditions	"free enrollment".

COMPLEMENTARY EDUCATION STANDARDS AND CURRICULUM

Competencies	GC 1. Ability for abstract thinking, analysis and synthesis. GC 2. Ability to apply knowledge in practical situations. GC 3. Knowledge and understanding of the subject area and profession. GC 7. Ability to conduct research at the appropriate level. GC 8. Ability to learn and master modern knowledge. PC1. The ability to establish the features of the structure and functioning of cells, tissues, organs, their systems and apparatuses of the body of animals of different classes and species - mammals, birds, insects (bees), fish and other vertebrates. PC2. Ability to use tools, special devices, instruments, laboratory equipment and other technical means to perform the necessary manipulations during professional activities. PC6. Ability to select, package, fix and ship samples of biological material for laboratory research. PC7. Ability to organize and conduct laboratory and special diagnostic tests and analyze their results.	**Program learning outcomes**	PLO3. Determine the essence of physicochemical and biological processes that occur in the animal body normally and during pathology.

STRUCTURE OF THE EDUCATIONAL COMPONENT (DISCIPLINE)

Section 1. FUNDAMENTALS OF PHYSICAL AND COLLOID CHEMISTRY.					
Lecture 1.	Introduction. Fundamentals of physicochemical processes: pH as a key environmental parameter, methods for its determination, biological role. Buffer systems.	**Laboratory and practical class 1 (LPC 1)**	Introduction. Physicochemical research methods in biochemistry.	**Independent work**	**Physical and colloidal chemistry.** 1. Osmotic phenomena in living systems – endosmosis, exosmosis, turgor, lysis, hemolysis. 2. Osmotic resistance of erythrocytes (ORE) and its practical use in clinical diagnostics .
Lecture 2.	Colloidal solutions: properties, structure, stability and biological significance in living organisms.	**LPC 2**	Preparation of solutions of different concentrations: calculations and methods.		
		LPC 3	Methods for determining the pH of water, acid solutions, blood serum and urine.		
		LPC 4	Study of buffer solutions: preparation, characteristics and functions in biochemical systems.		
		LPC 5	Study of colloidal solutions: preparation, characteristics and analysis methods		
		LPC 6	Surface phenomena and adsorption		
Section 2. PROTEINS, NUCLEIC ACIDS. BIOLOGICALLY ACTIVE SUBSTANCES: VITAMINS, ENZYMES, HORMONES.					
Lecture 3.	Vitamins: classification, chemical composition and role in the body's metabolic processes. Fat-soluble vitamins.	**LPC 7**	Proteins. Qualitative reactions to proteins and amino acids	**Independent work**	**Proteins. Nucleic acids.** 1. General characteristics. 2. What diseases or health conditions can be associated with a deficiency or disruption of the structure of proteins and nucleic acids in the body? 3. What methods are used to study proteins and nucleic acids in scientific research? 4. What factors affect the folding and unfolding of proteins? 5. What technologies are used to produce and study proteins in industry and medicine?
Lecture 4.	Enzymes: structure, classification, mechanisms of action and role in metabolism.	**LPC 8**	Physicochemical properties of proteins. Classification of proteins		
Lecture 5.	Hormones and their role in metabolic processes. Mechanisms of regulatory influence on metabolism.	**LPC 9**	Nucleic acids and their components.		
		LPC 10	Fat-soluble vitamins: their structure, detection methods and biological role in the body.		

		LPC 11	Water-soluble vitamins: structure, functions and role of coenzymes in biochemical processes.		
		LPC 12	Enzymes: mechanisms of action, classification and their role in biochemical reactions.		**Biologically important heterocyclic compounds.**
		LPC 13	Study of the regulation of enzymatic processes. Classification of enzymes.		**Vitamin-like compounds.**
		LPC 14	Hormones and their role in metabolic processes. Mechanisms of regulatory influence on metabolism.		**Biochemical foundations of veterinary enzymology.** **Hormones and other bioregulators of lipid origin.**
		LPC 15	Characteristics of individual representatives of hormones of central and peripheral endocrine glands.		
Section 3. BASICS OF METABOLISM. EXCHANGE OF SUBSTANCES					
Lecture 6.	Carbohydrate chemistry. Carbohydrate metabolism: specifics and features in different animal species.	**LPC 16**	Biological membranes. Fundamentals of metabolism. Biological oxidation.	**Independent work**	**Biological membranes** 1. Structure, components, characteristics of lipid components. 2. Membrane proteins and their functions. **3.** Transport of substances through biological membranes.
Lecture 7.	Lipids: chemistry and biological functions. Features of metabolism in animals.	**LPC 17**	Carbohydrate Chemistry. Qualitative Reactions and Properties		
		LPC 18	Digestion and absorption of carbohydrates: enzymes and mechanisms of monosaccharide transport		**Metabolism (carbohydrates, lipids):** 1. **Metabolism during starvation in animals:** how the body adapts to the lack of nutrients and what biochemical processes are activated. 2. **Metabolic features in herbivores and carnivores:** comparison of metabolic pathways in different animal species depending on the type of nutrition. 3. **Diseases associated with metabolic disorders in animals :** for example, diabetes, obesity, ketosis.
		LPC 19	Carbohydrate catabolism (glycolysis, Krebs cycle, PFS).		
		LPC 20	Carbohydrate anabolism (glycogenesis , gluconeogenesis , regulation).		
		LPC 21	Lipid chemistry. Lipid metabolism (digestion, absorption, cellular		

			metabolism).		
		LPC 22	Lipid digestion and absorption: the role of bile acids and lipases		
		LPC 23	Lipid catabolism (β-oxidation, ketogenesis).		
		LPC 24	Lipid anabolism (synthesis of fatty acids, TAG, cholesterol).		
Section 4. PROTEIN AND NUCLEIC ACIDS EXCHANGE. INTERCONNECTION AND REGULATION OF METABOLIC PROCESSES					
Lecture 8.	Protein metabolism: absorption and biological role.	**LPC 25**	Metabolism of simple proteins. Biological role, need and absorption.	**Independent work**	**Water-salt metabolism** 1. Water, its importance in a living organism. 2. Macronutrients. 3. Microelements.
Lecture 9.	Amino acid metabolism: general and specific pathways.	**LPC 26**	Protein metabolism. Protein biosynthesis.		
		LPC 27	Exchange of complex proteins nucleo - and chromoproteins (theoretical lesson)		**Biochemistry of tissues and organs** 1. Blood biochemistry. 2. Muscle biochemistry. 3. Biochemical functions of the liver. 4. Biochemistry of nervous tissue
		LPC 28	Interrelation and regulation of metabolic processes.		
		LPC 29	Final lesson from the course "Animal Biochemistry".		

BASIC LITERATURE AND METHODOLOGICAL MATERIALS

Literature	1. Kononsky O.I. Physical and colloidal chemistry: Textbook. – 2nd ed., supplemented and corrected./ O.I. Kononsky – K.: Center for Educational Literature, 2009. – 312p. 2. Chechotkin O.V. Biochemistry of agricultural animals / O.V. Chechotkin , V.I. Voronyansky , M.I. Kartashov . – Kharkiv, RVV KhZVI, 2000 – 464 p. 3. Gubskyi Y.I. Biological Chemistry. Textbook / Y.I. Gubskyi. – Kyiv – Vinnytsia: NOVA KNYGA, 2009. – 664 p. 4. Practical course in biological chemistry. Teaching and methodological manual for students of agricultural educational institutions of III-IV levels of accreditation / edited by Professor O.V. Zhegunov . – Kharkiv: "BURUN i K", 2014. – 304p. 5. Tsekhmistrenko S.I., Kononskyi O.I., Tsekhmistrenko O.S. Animal biochemistry with the basics of physical and colloidal chemistry. Workshop: Teaching aid . – Bila Tserkva, 2011. – 216 p.	Methodological support	1. Hladka N.I., Prykhodchenko V.O., Denisova O.M., Yakymenko T.I. Animal Biochemistry. Workbook for laboratory and practical classes – Kharkiv: DBTU, 2023. – 80 p. 2. Yakymenko T.I., Hladka N.I., Prykhodchenko V.O., Denisova O.M. Biological oxidation: Methodological manual. Kh.: Stil- Izdat , 2020. 26 p. 3. Prykhodchenko V.O., Hladka N.I., Denisova O.M., Yakymenko T.I. Carbohydrates: structure and metabolism: Methodological manual. - Kh.: Stil- Izdat , 2020. -54 p. 4. Hladka N.I., Prykhodchenko V.O., Denisova O.M., Yakymenko T.I. Chemistry and lipid metabolism: Methodological manual. Kh.: Stil- Izdat , 2020. 50 p. 5. Hladka N.I., Prykhodchenko V.O., Denisova O.M., Yakymenko T.I. Metabolism of simple proteins: Methodological manual. Kh.: Stil- Izdat , 2020. - 42 p. 6. Hladka N.I., Prykhodchenko V.O., Denisova O.M. Blood biochemistry: Methodological manual. - Kh.: RVV. DBTU, 2021.- 40p. 7. Prykhodchenko V.O., Hladka N.I., Denisova O.M., Yakymenko T.I. Biologically active substances: vitamins, enzymes, hormones: Methodological manual. Kh.: Stil -Izdat , 2022. -74 p.

EVALUATION SYSTEM

	SYSTEM	POINTS	ACTIVITY TO BE EVALUATED
Final assessment (different credit, exam)	100 points ECTS (standard)	up to 100	40% - final testing 60 % - student's current work during the semester
Final assessment (non-differential credit)	100 points ECTS (standard)	up to 100	100% - average grade for sections
Rating of section	100 points total	up to 30	30% - answers on test questions
		up to 30	30% - the result of mastering the block of independent work
		up to 40	40% - student activity in classes (oral answers)

NORMS OF ACADEMIC ETHICS AND INTEGRITY

All participants in the educational process (including students) must adhere to the code of academic integrity and the requirements set forth in the regulation " On Academic Integrity of Participants in the Educational Process of DBTU ": to demonstrate discipline, good manners, respect each other's dignity, show kindness, honesty, and responsibility.