



SYLLABUS OF AN ACADEMIC DISCIPLINE
«Biochemistry of Animals with the Basics of Physical and Colloid Chemistry»

Degree of higher education - Master
Specialty - 211 Veterinary Medicine

Educational program «Veterinary Medicine»

Year of study - 2, semester - 3 and 4

Form of full-time study, full-time study

Number of ECTS credits – 6

The language of instruction is English | Ukrainian

Lecturer of the discipline

Kalachniuk LH, Professor of the Department of Biochemistry and Physiology of Animals named after Acad. M.F. Gulyi,
Doctor of Biological Sciences, Professor

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**URL of the e-learning
course on the NULES e-
learning portal**

<https://elearn.nubip.edu.ua/course/view.php?id=686>

DESCRIPTION OF THE DISCIPLINE

«Biochemistry of Animals with the Basics of Physical and Colloid Chemistry» is a mandatory component of the educational program «Veterinary Medicine», which provides basic concepts about the chemical composition of animals, classification, functions of proteins, carbohydrates, lipids, minerals, enzymes, hormones and vitamins. The main ways of biochemical processes that provide homeostasis, energy balance, growth and development of animals are subject to study. Significant attention is paid to the study of the biochemical composition of biological fluids and tissues of animals and the processes that occur in them.

Acquisition of competencies: study of the discipline "Biochemistry of Animals with the Basics of Physical and Colloid Chemistry" provides mastery
- *integral competence* - the ability to solve complex tasks and problems in the field of veterinary medicine, which involves conducting research and/or implementing innovations and is characterized by the uncertainty of conditions and requirements

- *general competencies*: 1) the ability to abstract thinking, analysis and synthesis; 2) the ability to apply knowledge in practical situations; 3) knowledge and understanding of the subject area and profession; 5) the ability to communicate in a foreign language;

- *professional competencies*: 1) the ability to establish the features of the structure and functioning of cells, tissues, organs, their systems and apparatus of animals of different classes and species - mammals, birds, insects (bees), fish and other vertebrates; 2) the ability to use tools, special devices, instruments, laboratory equipment and other technical means to carry out the necessary manipulations during professional activities; 3) the ability to follow the rules of

labor protection, asepsis and antiseptics during professional activities, the ability to use modern knowledge of the laws of biochemistry of different species of animals to effectively manage the treatment of animals and the use of medicines.

Programme learning outcomes: to determine the essence of physico-chemical and biological processes that occur in the body of animals in normal and pathological conditions.

COURSE STRUCTURE

Theme	Hours (lectures / laboratory)	Learning outcomes	Tasks	Assessment
2nd year of the study, 3rd semester				
Thematic Module 1. <u>Basics of Physical and Colloid Chemistry</u>				
Theme 1. Introduction Biochemistry of Animals with the Fundamentals of Physical and Colloidal Chemistry, the history of its development as a science and the place between natural Sciences (<i>the introductory lecture</i>)	2/2	<i>Know</i> the basic concepts of physical and colloid chemistry, which describe the processes occurring in animals: pH, acidosis, alkalosis, osmosis, diffusion, sorption. <i>Be able</i> to determine the pH of body fluids, classify colloidal solutions, sorbents. <i>Use</i> centrifuges, homogenizers, pH meters, photoelectrocolorimeters and other modern laboratory devices for laboratory studies of the animal body.	<i>Preparation for lectures</i> (preliminary acquaintance with the presentation and full-text lecture in eLearn). <i>Execution and delivery of laboratory work</i> (in methodical recommendations - during laboratory employment, and independently - in eLearn). <i>Doing independent work</i> (tasks in eLearn). <i>Preparation and writing of a modular test</i> (descriptive part in the form of written / oral answer - in the classroom, test - in eLearn).	<i>Execution and delivery of laboratory and independent works</i> , as well as <i>Modular control</i> in the form of <i>tests</i> (in eLearn) and <i>oral/written survey</i> - according to the evaluation log in eLearn
Theme 2. Basics of Physical Chemistry	6/8			
Theme 3. Basics of Colloid Chemistry	4/6			
Thematic Module 2. Physico-chemical methods of research in biochemistry				
Theme 1. Physico-chemical methods of research in biochemistry	4/8	<i>Know</i> the basic concepts of physicochemical methods used in biochemical research, namely: photoelectrocolorimetry, spectrophotometry, centrifugation, electrophoretic and chromatographic methods used in biochemical research. <i>Be able</i> to determine the optical density, to separate substances by centrifugation, electrophoretic and chromatographic methods. <i>Use</i> centrifuges, homogenizers, pH meters, photoelectrocolorimeters and other modern laboratory devices for laboratory biochemical studies.	<i>Preparation for lectures</i> (preliminary acquaintance with the presentation and full-text lecture in eLearn). <i>Execution and delivery of laboratory work</i> (in methodical recommendations - during laboratory employment, and independently - in eLearn). <i>Doing independent work</i> (tasks in eLearn). <i>Preparation and writing of a modular test</i> (descriptive part in the form of written / oral answer - in the classroom, test - in eLearn).	<i>Execution and delivery of laboratory and independent works</i> , as well as <i>Modular control</i> in the form of <i>tests</i> (in eLearn) and <i>oral/written survey</i> - according to the evaluation log in eLearn
Thematic Module 3. Static biochemistry				
Theme 1. Cell and its organic compounds. Carbohydrates	4/8	<i>Know</i> the cell and its organic compounds: carbohydrates, lipids, amino acids, proteins and	<i>Preparation for lectures</i> (preliminary acquaintance with the presentation and full-text lecture in eLearn).	

Theme 2. Lipids and biomembranes	2/4	nucleic acids, as well as their classification, structural components and biological significance for life as cells. and the whole body of the animal.	<i>Execution and delivery of laboratory work</i> (in methodical recommendations - during laboratory employment, and independently - in eLearn). <i>Doing independent work</i> (tasks in eLearn). <i>Preparation and writing of a modular test</i> (descriptive part in the form of written / oral answer - in the classroom, test - in eLearn).	<i>Execution and delivery of laboratory and independent works</i> , as well as <i>Modular control</i> in the form of <i>tests</i> (in eLearn) and <i>oral/written survey</i> - according to the evaluation log in eLearn
Theme 3. Amino acids, peptides, proteins,	6/4	<i>Understand</i> the functions of carbohydrates, lipids, amino acids, proteins and nucleic acids in animals and their interaction with each other.		
Theme 4. Nucleosides, nucleotides and nucleic acids	2/5	<i>Be able</i> to determine carbohydrates, lipids, amino acids, proteins and nucleic acids in biological fluids and tissues of animals. <i>Use</i> laboratory equipment, reagents and modern laboratory instruments to study the presence and properties of carbohydrates, lipids, amino acids, proteins and nucleic acids.		
2nd year of the study, 4th semester				
Thematic Module 4. Regulatory effects of inorganic and organic substances on the metabolism				
Theme 1. Biomembranes. Water and mineral balance and its effect on the metabolism	2/4	<i>Know</i> the structure and basics of classification of minerals, vitamins and coenzymes, enzymes and hormones.	<i>Preparation for lectures</i> (preliminary acquaintance with the presentation and full-text lecture in eLearn). <i>Execution and delivery of laboratory work</i> (in methodical recommendations - during laboratory employment, and independently - in eLearn). <i>Doing independent work</i> (tasks in eLearn). <i>Preparation and writing of a modular test</i> (descriptive part in the form of written / oral answer - in the classroom, test - in eLearn).	<i>Execution and delivery of laboratory and independent works</i> , as well as <i>Modular control</i> in the form of <i>tests</i> (in eLearn) and <i>oral/written survey</i> - according to the evaluation log in eLearn
Theme 2. Vitamins. Coenzymes	2/4	<i>Understand</i> the functions of minerals, vitamins, enzymes and hormones in animals and their impact on the biochemical processes of the animal body. <i>Be able</i> to determine minerals, hormones, vitamins and enzymes in biological fluids and tissues of animals.		
Theme 3. Enzymes and their kinetic properties	2/4	<i>Use</i> laboratory equipment, reagents and modern laboratory instruments to study the content and properties of minerals, vitamins, enzymes and hormones.		
Theme 4. Hormones and mechanisms of their influence on metabolic processes	2/4			
Thematic Module 5. Dynamic and Functional Biochemistry				
Theme 1. Biochemistry of digestion and features of digestive processes in different organisms	2/2	<i>Know</i> the stages of digestion in ruminants and animals with a single-chambered stomach. <i>Understand</i> the biochemical processes occurring in the body, especially during digestion, as well as the metabolic processes of carbohydrates, lipids, proteins and nucleic acids.	<i>Preparation for lectures</i> (preliminary acquaintance with the presentation and full-text lecture in eLearn). <i>Execution and delivery of laboratory work</i> (in methodical recommendations - during laboratory employment, and independently - in eLearn). <i>Doing independent work</i> (tasks in eLearn). <i>Preparation and writing of a modular test</i> (descriptive part in the form of written / oral answer - in the classroom, test - in eLearn).	<i>Execution and delivery of laboratory and independent works</i> , as well as <i>Modular control</i> in the form of <i>tests</i> (in eLearn) and <i>oral/written survey</i> - according to the evaluation log in eLearn
Theme 2. Metabolism of carbohydrates and its peculiarities (in ruminants)	4/8	<i>Be able</i> to determine the biochemical composition of tissue samples and biological animals and analyze the corresponding changes according to the experimental conditions.		
Theme 3. Amphibolic transformation of organic substances (TCAC). Energy of biochemical processes	2/4	<i>Use</i> modern laboratory instruments, reagents and equipment for laboratory biochemical research.		
Theme 4. Metabolism of lipids	4/2			

Theme 5. The metabolic processes of proteins and some amino acids	4/4			
Theme 6. Catabolism and anabolism of nucleotides and nucleic acids	2/4			
Thematic Module 6. Metabolism and its reflection in the biochemical parameters				
Theme 1. Reflection of metabolic transformations in biochemical parameters of biological fluids. Biochemical indexes of urine	2/2	<i>Know</i> the biochemical composition of the main biological fluids and tissues of animals - urine, milk, meat, etc. <i>Understand</i> the biochemical processes occurring in urine, milk, meat, etc ..	<i>Preparation for lectures</i> (preliminary acquaintance with the presentation and full-text lecture in eLearn). <i>Execution and delivery of laboratory work</i> (in methodical recommendations - during laboratory employment, and independently - in eLearn). <i>Doing independent work</i> (tasks in eLearn).	<i>Execution and delivery of laboratory and independent works</i> , as well as <i>Modular control</i> in the form of <i>tests</i> (in eLearn) and <i>oral/written survey</i> - according to the evaluation log in eLearn
Theme 2. Biochemical parameters of milk. Influence of exogenous factors on animal productivity	2/3	<i>Be able</i> to determine the biochemical composition of biological fluids of urine, milk, meat, etc. <i>Use</i> modern laboratory instruments, reagents and equipment for laboratory tests of biological fluids, urine, milk, meat, etc.	<i>Preparation and writing of a modular test</i> (descriptive part in the form of written / oral answer - in the classroom, test - in eLearn).	
Possibility to receive additional scores:	Additional scores can be obtained for preparing a report and participating in a student conference			Up to 10 points
Total for the semester				70
Exam				30
All together				100

ASSESSMENT POLICY

<i>Deadlines and exam retaking policy:</i>	Laboratory, independent and modular works must be submitted in the planned time before the end of the study of the current module. Violation of the deadlines without a good reason entitles the teacher to lower the grade. Reassignment of modular control work occurs in the presence of valid reasons (for example, hospital) and is allowed in the term before the end of the following module.
<i>Academic integrity policy:</i>	Copying, use of mobile devices, and additional literature when writing modular tests, tests and exams are strictly prohibited.
<i>Attendance policy:</i>	Attendance at lectures and laboratory classes is mandatory for all students in the group. Late classes are not allowed. A lab coat is a must in laboratory classes. For objective reasons (for example, illness, international internship) training can take place according to an individual curriculum approved in a certain order. Missed lectures, after their processing by the applicant of higher education, are worked out in the form of an interview with the teacher. Missed laboratory classes are worked out by students in the laboratory of the department, information about the practice is entered into the departmental journal of the practice of missed classes.

SCALE FOR ASSESSING STUDENTS 'KNOWLEDGE AND SKILLS

Student's rating, points	National grading of exams and credits	
	exams	credits
90-100	excellent	pass
74-89	good	
60-73	satisfactorily	
0-59	unsatisfactorily	fail

RECOMMENDED SOURCES OF INFORMATION

1. Biochemistry of animals with the basics of physical and colloid chemistry. L. Kalachniuk, V. Tomchuk. [Manual] Kyiv – 2022. 240 p. 2. Koolman J., Röhm K-H. Color Atlas of Biochemistry. Thieme. 2013. 506 p. 3. Спеціальна біохімія : навчальний посібник для студентів вищих навчальних закладів [Заредакцією член-кореспондента НААУ С.Д. Мельничука.] Автори: С.Д. Мельничук, С.В.Хижняк, В.І. Цвіліховський, Грищенко, В.А. Томчук, Є.А. Деркач, Н.М. Мельникова, Л.Г. Калачнюк, Г.І. Калачнюк, О.М. Тупицька.– Київ, 2014. – 371с. 4. Біохімія. Підручник / Л.І. Остапченко, Т.Р. Андрійчук, Ю.Д. Бабенюк та ін. / Заред. Л.І.Остапченко / – К.: Видавничо-поліграфічний центр «Київський університет», 2012. –796с. 5. Губський Ю.І. Біологічна хімія. Київ – Вінниця: Нова книга, 2007. – 655 с. 6. Thomas D. Pollard, William C. Earnshaw, Ph. D. Cell biology. – Elsevier Science (USA), 2002.– 804 p. 7. Berg J.M., Tymoczko J.L., Stryer L. Biochemistry. – New York: WH Freeman; 2002. 1515p. 8. Кучеренко М.Є., Бабенюк Ю.Д., Войціцький В.М. Сучасні методи біохімічних досліджень. К.: Фітосоціоцентр, 2001. – 424 с. 9. Біохімія тварин з основами фізичної і колоїдної хімії: підручник / В.А. Томчук, Л.Г.Калачнюк, В.А. Грищенко, Л.В. Кліх, І.В. Калінін, О.М. Тупицька, В.І. Цвіліховський, О.В. Арнаута, Т.А. Ткаченко – 2 вид., перероб. та доп. – Київ: НУБіП України, 2023. – 512с.