



SYLLABUS OF AN ACADEMIC DISCIPLINE

«Veterinary Clinical Biochemistry»

Academic degree - Master
Specialty - 211 Veterinary Medicine
Academic programmer «Veterinary Medicine»
Year of study - 4, semester - 7
Form of study full-time
Number of ECTS credits – 4
The languages of instruction English | Ukrainian

Course lecturer

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Course page in eLearn

<https://elearn.nubip.edu.ua/course/view.php?id=1345>

ACADEMIC DISCIPLINE DESCRIPTION

The discipline "Veterinary Clinical Biochemistry" is a mandatory component of the educational program "Veterinary Medicine". It gives students an understanding of the relationship between abnormal laboratory data and specific organ dysfunctions; diagnosis and prognostic value of laboratory tests; mastery of the technique of correct sampling and interpretation of results for hematological and clinical chemical evaluation.

The study of the discipline "Veterinary Clinical Biochemistry" provides the acquisition of such general competencies as knowledge and understanding of the subject area, the ability to search, process and analyze information from various sources, the ability to apply knowledge in practical situations.

ACQUISITION COMPETENCIES

Competences of the discipline

Integral competence (IC):

Ability to solve complex tasks and problems in the industry of veterinary medicine, which involves carrying out research and/or implementation of innovations and is characterized by uncertainty of conditions and requirements.

General competencies (GC):

1. Ability to abstract thinking, analysis and synthesis.
2. Ability to apply knowledge in practical situations.
3. Knowledge and understanding of the subject area and profession.
4. Ability to communicate in the state language both orally and in writing.
5. Ability to conduct research at the appropriate level.
6. Ability to make informed decisions.
7. The desire to preserve the environment.

Special (professional) competences (SC):

1. Ability to use tools, special devices, instruments, laboratory equipment and other technical means to carry out the necessary manipulations during professional activities.
2. Ability to follow the rules of labor protection, asepsis and antiseptics during professional activities.
3. Ability to take, pack, record and send samples of biological material for laboratory research.
4. Ability to organize and conduct laboratory and special diagnostic tests and analyze their results.

5. Ability to apply knowledge of biosafety, bioethics and animal welfare in professional activities.
6. Ability to develop and implement measures to protect the population from diseases common to animals and humans.
7. Ability to protect the environment from contamination by livestock waste, as well as materials and veterinary products.
8. Ability to use specialized software to perform professional tasks.
9. Ability to organize, implement and control the flow of documents during professional activities.

Expected Learning Outcomes (ELO):

Attestation is carried out in the form of a single state qualifying exam.

ACADEMIC DISCIPLINE STRUCTURE

Theme	Hours (lectures / laboratory)	Learning outcomes	Tasks	Assessment
One semester				
Thematic Module 1.				
Theme 1. Objects and methods in veterinary clinical biochemistry.	1/4	<p><i>Know:</i> methods of obtaining and preparing for the study of blood, urine, saliva, scar content, digestive juices, bile, cerebrospinal fluid, synovial fluid and other biological fluids of domestic and farm animals, physico-chemical methods of clinical biochemistry and instrumentation;</p> <p>species, breed and age features of biochemical parameters (blood, urine, cerebrospinal fluid, digestive juices, saliva, etc.) in healthy animals and their dependence on physiological condition, type of feeding and productivity; international system of SI units in clinical laboratory diagnostics.</p> <p><i>Be able</i> to receive plasma and blood serum, to determine the pH of body fluids.</p> <p><i>Use</i> centrifuges, homogenizers, pH meters, photoelectrocolorimeters and other modern laboratory devices for laboratory studies of the animal body.</p>	Preparation for lectures (preliminary acquaintance with the presentation and full-text lecture in eLearn). Execution and delivery of laboratory work (in methodical recommendations - during laboratory employment, and independently - in eLearn). Doing independent work (tasks in eLearn). Preparation and writing of a modular test (descriptive part in the form of written / oral answer - in the classroom, test - in eLearn).	4
Theme 2.	2/8	<i>Know:</i> violation of protein	Preparation for	8

<p>Disorders of protein metabolism in the case of diseases of the internal organs of animals.</p>		<p>homeostasis; etiology of hypo- and hyperproteinemia, dysproteinemia, paraproteinemia and proteinuria; clinical interpretation of the results of determining the content of total protein and protein fractions; the importance of colloidal sediment tests in the diagnosis of disorders of protein metabolism in pathology of the liver and other organs; biochemical methods for diagnosing pathology of protein metabolism in the body; methods and clinical and diagnostic value of determination in blood and urine of components of residual Nitrogen (urea, variable Nitrogen, uric acid, ammonia, creatine, creatinine, indican, etc.); azotemia (relative and absolute, productive and retention). <i>Be able</i> to determine total protein and its blood fractions and non-protein nitrogenous compounds in blood and urine. <i>Use</i> centrifuges, photoelectrocolorimeters, spectrophotometers and other modern laboratory devices for laboratory research.</p>	<p>lectures (preliminary acquaintance with the presentation and full-text lecture in eLearn). Execution and delivery of laboratory work (in methodical recommendations - during laboratory employment, and independently - in eLearn). Doing independent work (tasks in eLearn). Preparation and writing of a modular test (descriptive part in the form of written / oral answer - in the classroom, test - in eLearn).</p>	
<p>Module 2. General and special clinical biochemistry</p>				
<p>Theme 3. Laboratory diagnosis of disorders of carbohydrate metabolism in the case of diseases of the internal organs of animals.</p>	<p>2/6</p>	<p>Know: disorders of intermediate carbohydrate metabolism (synthesis and breakdown of monosaccharides, oligosaccharides, glycogen); disorders of gluconeogenesis; clinical interpretation of hypo- and hyperglycemia, glucosuria, fructosuria and galactosuria; disorders of</p>	<p>Preparation for lectures (preliminary acquaintance with the presentation and full-text lecture in eLearn). Execution and delivery of laboratory work (in methodical</p>	<p>13</p>
<p>Theme 4. Laboratory diagnosis of</p>	<p>2/6</p>			

<p>disorders lipid metabolism in the case of diseases of the internal organs of animals.</p>		<p>heteropolysaccharide metabolism; disorders of intermediate lipid metabolism in the case of diseases of the intestines, liver and pancreas; adiposity. lipomobilization syndrome; fatty infiltration of the liver, atherosclerosis; ketogenesis and its disorders; indicators of lipid peroxidation and antioxidant defense system of the body; biochemical methods for diagnosing disorders of carbohydrate and lipid metabolism. Be able to determine glucose and its derivatives, cholesterol, ketone bodies in the blood and urine. Use centrifuges, photoelectrocolorimeters, spectrophotometers and other modern laboratory devices for laboratory research.</p>	<p>recommendations - during laboratory employment, and independently - in eLearn). Doing independent work (tasks in eLearn). Preparation and writing of a modular test (descriptive part in the form of written / oral answer - in the classroom, test - in eLearn).</p>	
<p>Theme 5. Clinical enzymological. Primary and secondary enzymopathy.</p>	<p>2/4</p>	<p><i>Know:</i> mechanisms of hyperenzymemia; types of enzymopathies; enzyme diagnostics and enzyme therapy; indicator enzymes and their role in the diagnosis of diseases of various organs and systems; determination of enzyme spectrum activity of enzymes (aspartate aminotransferase, alanine aminotransferase, lactate dehydrogenase, gamma-glutamyltranspeptidase, alkaline and acid phosphatases, glutamate dehydrogenase, creatine phosphokinase, alpha-amylase; clinical interpretation of the obtained results.</p>	<p>Preparation for lectures (preliminary acquaintance with the presentation and full-text lecture in eLearn). Execution and delivery of laboratory work (in methodical recommendations - during laboratory employment, and independently - in eLearn). Doing independent work (tasks in eLearn).</p>	<p>11</p>
<p>Theme 6. Enzymodiagnosics in the pathology of the internal organs of animals.</p>	<p>0/4</p>	<p><i>Be able</i> to determine aspartate aminotransferase, alanine aminotransferase, gamma-</p>	<p>Preparation and writing of a modular test (descriptive part</p>	

		glutamyltranspeptidase in the blood. <i>Use</i> centrifuges, photoelectrocolorimeters, spectrophotometers and other modern laboratory devices for laboratory research.	in the form of written / oral answer - in the classroom, test - in eLearn).	
Theme 7. Clinical chemistry with the pathology of the digestive system, liver and pancreas.	2/4	<i>Know:</i> laboratory diagnosis of metabolic disorders during pancreatic dystonia in ruminants, acidosis and scar alkalosis; laboratory diagnosis of disorders of metabolic processes in diseases of the stomach and intestines of different species of animals; disorders of carbohydrate, lipid and protein metabolism in liver pathology; biochemistry and pathobiochemistry of bilirubin metabolism in the liver; biochemical methods for diagnosing liver dysfunction and monitoring its recovery. <i>Be able</i> to determine total and direct bilirubin, vitamin A in serum (plasma). <i>Use</i> centrifuges, photoelectrocolorimeters, spectrophotometers and other modern laboratory devices for laboratory research.	Preparation for lectures (preliminary acquaintance with the presentation and full-text lecture in eLearn). Execution and delivery of laboratory work (in methodical recommendations - during laboratory employment, and independently - in eLearn). Doing independent work (tasks in eLearn). Preparation and writing of a modular test (descriptive part in the form of written / oral answer - in the classroom, test - in eLearn).	10
Theme 8. Biochemistry and pathobiochemistry blood system in animals in the pathology of internal organs.	2/2	<i>Know:</i> hemoglobin metabolism disorders; biochemical changes in the blood during anemia; mechanisms of blood coagulation and pathobiochemistry of blood coagulation; disorders of the hemostasis system (hypocoagulation, hypercoagulation and discoagulation); disorders of myocardial metabolism in myocardial infarction, myocarditis, pericarditis,	Preparation for lectures (preliminary acquaintance with the presentation and full-text lecture in eLearn). Execution and delivery of laboratory work (in methodical recommendations - during laboratory	8

		<p>coronary heart disease and heart attack; biochemical methods for diagnosing myocardial diseases.</p> <p><i>Be able</i> to determine the hemoglobin of blood and urine.</p> <p><i>Use</i> centrifuges, photoelectrocolorimeters, spectrophotometers and other modern laboratory instruments and equipment for laboratory research.</p>	<p>employment, and independently - in eLearn).</p> <p>Doing independent work (tasks in eLearn).</p> <p>Preparation and writing of a modular test (descriptive part in the form of written / oral answer - in the classroom, test - in eLearn).</p>	
<p>Theme 9. Determination of water-electrolyte and acid-base status of animals in the pathology of the internal organs of animals.</p>	0/2	<p><i>Know:</i> disorders of water-electrolyte metabolism in the case of diseases of the internal organs of animals; types of dehydration; causes of hypo- and hypernatremia, hypo- and hyperkalemia, hypo- and hyperchloremia;</p> <p>characteristics of acid-base balance in animals and mechanisms of their regulation; acid-base imbalance in animal diseases; biochemical methods for diagnosing disorders of water-ion metabolism and acid-base balance in the body.</p> <p><i>Be able</i> to determine total phosphorus, calcium, buffer capacity in the blood and acid-base status of blood and urine.</p> <p><i>Use</i> centrifuges, photoelectrocolorimeters, spectrophotometers and other modern laboratory instruments and equipment for laboratory research.</p>	<p>Preparation for lectures (preliminary acquaintance with the presentation and full-text lecture in eLearn).</p> <p>Execution and delivery of laboratory work (in methodical recommendations - during laboratory employment, and independently - in eLearn).</p> <p>Doing independent work (tasks in eLearn).</p> <p>Preparation and writing of a modular test (descriptive part in the form of written / oral answer - in the classroom, test - in eLearn).</p>	6
<p>Theme 10. Laboratory diagnosis in the pathology of the urinary system</p>	2/4	<p><i>Know:</i> features of metabolism in the kidneys and in pathology; glomerular filtration rates and their diagnostic value; biochemical methods of diagnosis in case of kidney</p>	<p>Preparation for lectures (preliminary acquaintance with the presentation and full-text lecture</p>	7

		<p>pathology; changes in the chemical composition of urine in diseases of the urinary system (glomerulonephritis, pyelonephritis, nephrotic syndrome, nephrosclerosis, renal failure, urolithiasis and urocystitis); pathological components of urine and their diagnostic value; biochemical mechanisms of urolithiasis.</p> <p><i>Be able</i> to determine urea and creatinine in the blood and urine.</p> <p><i>Use</i> centrifuges, photoelectrocolorimeters, spectrophotometers and other modern laboratory instruments and equipment for laboratory research</p>	<p>in eLearn). Execution and delivery of laboratory work (in methodical recommendations - during laboratory employment, and independently - in eLearn). Doing independent work (tasks in eLearn). Preparation and writing of a modular test (descriptive part in the form of written / oral answer - in the classroom, test - in eLearn).</p>	
Theme 11. Biochemical methods immunodeficiency state of animals.	0/1	<p><i>Know</i>: changes in thymol and zinc sulfate tests for parenchymal hepatitis and liver cirrhosis; changes in serum γ-globulin concentrations in bacterial, viral, autoimmune and parasitic infections, cholecystitis, liver cirrhosis, pyelonephritis, acute polyarthritis, sepsis, hemolytic jaundice; the importance of hypogamma globulinemia in the depletion of the immune system and the causes of agamma globulinemia.</p> <p><i>Be able</i> to determine thymol, zinc sulfate tests, blood immunoglobulins.</p> <p><i>Use</i> centrifuges, photoelectrocolorimeters, spectrophotometers, immunochromatography and other modern laboratory instruments and equipment for laboratory research</p>	<p>Preparation for lectures (preliminary acquaintance with the presentation and full-text lecture in eLearn). Execution and delivery of laboratory work (in methodical recommendations - during laboratory employment, and independently - in eLearn). Doing independent work (tasks in eLearn). Preparation and writing of a modular test (descriptive part in the form of written / oral answer - in the classroom, test -</p>	3

			in eLearn).	
Total for the semester				70 points
Test				30 points
All together				100 points

ASSESSMENT POLICY

Deadlines and exam retaking policy:	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.
Academic Integrity Policy:	Copying, use of mobile devices, and additional literature when writing modular tests, tests and exams are strictly prohibited.
Attendance policy:	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. Tomchuk V.A., Gryshchenko V.A., Tsvilikhovskyi V.I. "Veterinary Clinical Biochemistry": Підручник / К: NULES of Ukraine Publishing House, 2023, 327 p.
2. Tomchuk V.A., Gryshchenko V.A., Tsvilikhovskyi V.I. Veterinary clinical biochemistry: textbook / Part 1. К.: НУБіП України, 2016. 268 p.
3. Tomchuk V.A., Gryshchenko V.A., Tsvilikhovskyi V.I. Veterinary clinical biochemistry: textbook / Part 2. К.: НУБіП України, 2017. 365 p.
4. Ветеринарна клінічна біохімія: навч. посіб. / Мельничук Д. О. та ін.; 2-ге вид. перероб і доп. Київ: НУБіП України, 2014. 456 с.
5. Біохімія тварин з основами фізичної і колоїдної хімії: підручник / [Томчук В.А., Грищенко В.А., Калачнюк Л.Г. та ін.] – К.: НУБіП України, 2020. – 447 с.
6. Ветеринарна клінічна біохімія / Левченко В. І., та ін. ; 2-ге видання, перероб. та доп. Біла Церква: Аграрна наука, 2019. 416 с.