

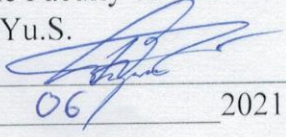
MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
STEPAN GZHYTSKYI NATIONAL UNIVERSITY OF VETERINARY
MEDICINE AND BIOTECHNOLOGIES LVIV

Faculty of Veterinary Medicine

Department of Normal and Pathological Physiology named after S. V. Stoianovskiy

APPROVMENT

Dean of the Faculty of Veterinary Medicine
Stronskiy Yu.S.


" 16 " 06 2021

STUDYING PROGRAM OF THE EDUCATIONAL DISCIPLINE

OK 2.6 «VETERINARY PATHOPHYSIOLOGY»

Educational Level Second

Branch of knowledge 21 «Veterinary Medicine»

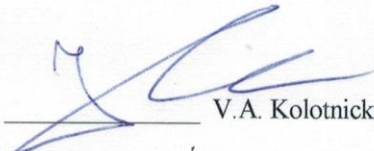
Specialty 221 «Veterinary Medicine»

Kind of discipline Mandatory

Lviv 2021

Studying program of the educational discipline «Veterinary pathophysiology» for foreign students of the second educational level of the speciality 221 «Veterinary medicine», branch of knowledge 21 «Veterinary Medicine».

Developer:
Associated Professor of Department of Normal and
Pathological Physiology named after S.V. Stoianovskiy,
PhD


V.A. Kolotnickyy

The studying program has been read and approved at the meeting of department of Normal and Pathological Physiology named after S.V. Stoianovskiy


protocol № 12 from « 18 » 05 2021

Head of the Department of Normal and
Pathological Physiology named after S.V. Stoianovskiy
doctor of veterinary medicine


I.I. Kovalchuk


Agreed by the Commission for the Protection of Vertebrate
Animals used for Experimental and Other Scientific Purposes
protocol № 10 from « 27 » 06 2021

Head of commission, Professor


A.R. Mysak

Agreed by the Educational and Methodological Commission
of the Specialty 211 «Veterinary Medicine»
protocol № 6 from « 21 » 05 2021

Head of commission, Professor


A.M. Tybinka

Approved by the Decision of the educational-methodical
Commission of the Faculty of Veterinary Medicine
protocol № 6 from « 21 » 06 2021

Head of commission, Professor


A.M. Tybinka

Approved by the Scientific Council of
the Faculty of Veterinary Medicine
protocol № 3 from « 16 » 06 2021

1. DESCRIPTION OF THE COURSE

Name of indicators	Hours in general
	Full-time
Number of credits / hours	7/210
Total hours of classroom work	112
including:	
• lectures, hours.	48
• practical classes, hours.	–
• laboratory work, hours.	64
seminars, hours	–
Total hours of individual work	98
Form of control	credit / exam

Note.

Percentage of student's classroom time:
for full-time education – 40 %.

2. The subject, purpose and objectives of the discipline

2.1. Subject, purpose of studying the discipline

Veterinary pathophysiology is a science that studies the vital processes of a diseased organism of different species of animals and their components (cells, subcellular structures, tissues, organs and organ systems) in unity and relationship with the environment.

The subject of the discipline is the study of the vital processes of the diseased organism of different species of animals and their components (cells, subcellular structures, tissues, organs and organ systems) in unity and relationship with the environment. It is a basic discipline in the education system in the specialty "Veterinary Medicine", as it studies the functions of all organs and organ systems of different species of animals.

The purpose of teaching the discipline "Veterinary pathophysiology" to give students theoretical and practical knowledge on the course of pathophysiological processes in all organs and organ systems in sick animals in unity and relationship with the environment

The discipline "Veterinary pathophysiology of animals" includes the following main sections: general nosology, body reactivity, pathophysiology of cells and tissues, pathophysiology of local blood circulation and microcirculation, inflammation, pathophysiology of thermoregulation, typical metabolic disorders, pathophysiology of blood and blood circulation, blood circulation liver, pathophysiology of the kidneys, reproductive and lactation systems, pathophysiology

of the endocrine and nervous systems. All these sections have direct theoretical and practical significance for the future specialty "Veterinary Medicine".

The study of the discipline "Veterinary pathophysiology" is based on the following mastered disciplines: zoology, anatomy, physiology, histology, biophysics, biochemistry with the basics of physical colloid chemistry.

The acquired knowledge of "Veterinary pathophysiology" is the basis for the study of the following disciplines: basics of animal breeding, animal feeding, veterinary clinical biochemistry, animal welfare and ethology, biosafety, biosecurity and bioethics, veterinary hygiene and sanitation, veterinary pharmacology, veterinary pharmacology, veterinary animals, obstetrics, gynecology and biotechnology of animals, operative surgery with the basics of topographic anatomy, epizootology and infectious diseases, parasitology and invasive diseases.

2.2. Objectives of the discipline

The study of the discipline involves the formation of students with the necessary competencies:

- general competencies:

- ✓ Ability to abstract thinking, analysis and synthesis.
- ✓ Ability to search, process information from various sources.
- ✓ Ability to apply knowledge in practical situations.
- ✓ Knowledge and understanding of the subject area and understanding of the profession.
- ✓ Ability to conduct research at the appropriate level, make informed decisions, evaluate and ensure the quality of work performed.
- ✓ Ability to communicate with non-specialists in their field (experts from other fields).
- ✓ Ability to work in an international context.
- ✓ Definiteness and persistence in relation to the set tasks and responsibilities.
- ✓ The desire to preserve the environment.

- professional competencies:

- ✓ The ability to understand and establish the features of the structure and functioning of cells, tissues, organs. Their systems and apparatus of the animal body.
- ✓ Ability to use tools, special devices, instruments, laboratory equipment and other technical means to carry out the necessary manipulations during the performance of professional activities.
- ✓ Ability to conduct clinical trials to draw conclusions about the condition of animals or to establish a diagnosis.
- ✓ Ability to organize, conduct and analyze laboratory and special studies.

2.3. Program learning outcomes

As a result of studying the discipline "Veterinary Pathophysiology" the student must be able to demonstrate the following learning outcomes:

know:

- ✓ Have knowledge of the structure of organs, their systems and apparatus and the body as a whole at the macro-, micro- and submicroscopic levels, know the

function, topography, determine the species and age of organs, their systems and apparatus under normal conditions and pathology.

- ✓ Know the basic parameters of the structure of organ function and the characteristics and purpose of technical devices used to determine these parameters.
- ✓ Know the rules of safety, personal hygiene, asepsis and antiseptics.
- ✓ Know the etiology and pathogenesis of diseases, analyze the epizootic and environmental situations, conditions of keeping, feeding and exploitation of animals,

be able to:

- ✓ To find out at the macro-, micro- and submicroscopic levels the structure, topography, species and age of organs, their systems and devices. To determine the function of cells, tissues, organs, their systems and apparatus of the animal body under normal conditions and pathology.
- ✓ Determine which technical means should be used in each case. Use tools, special devices, instruments, laboratory equipment and other technical means to determine the condition of the animal's body or perform the necessary manipulations.
- ✓ Take the necessary measures to comply with the rules of technology and personal hygiene. Adhere to asepsis and antiseptics during professional activities.
- ✓ Analyze the results of laboratory tests and formulate conclusions, recommendations, advice or diagnosis.

3. STRUCTURE OF THE EDUCATIONAL DISCIPLINE

3.1. Distribution of training classes by chapters of discipline

Names of sections and topics	Number of hours					
	Full time					
	Total	Total				
lec		pr	lab	in	ind.	
Chapter 1 General nosology	16	4	-	8	-	4
Chapter 2 Reactivity of the organism. Pathophysiology of cells and tissues.	16	4	-	6	-	6
Chapter 3 Pathophysiology of local blood circulation and microcirculation. Inflammation.	16	4	-	8	-	4
Chapter 4 Pathophysiology of thermoregulation. Typical metabolic disorders.	20	4	-	10	-	6
Chapter 5 Pathophysiology of blood, system blood circulation and respiration	36	12	-	14	-	10
Chapter 6 Pathophysiology of digestion and liver	18	8	-	6	-	4
Chapter 7 Pathophysiology of the kidneys, systems reproduction and lactation	16	8	-	4	-	4
Chapter 8 Pathophysiology of endocrine and nervous system	17	4	-	8	-	5
Together	210	48	-	64	-	98

3.2. Lectures

№	The names of the topics and their summary	Number of hours
		Full time
Chapter 1: General nosology		
1	<p>The subject and tasks of pathophysiology, its place in the system of higher veterinary education, connection with other disciplines.</p> <p>Basic concepts. Pathological reaction, process and condition. Experiment and its types. The concept of disease. Classification of diseases. The course of the disease, periods of disease development. Causes of the disease: external and internal. Types of damage. Ways of spreading pathogens in the body. Etiology and its classification. Local and general reactions to damage. Pathogenesis, mechanism of pathogenesis. The importance of constitution, species, age and sex in the occurrence of the disease.</p>	2
2	<p>Pathogenic effect of physical, mechanical, chemical and biological factors. Traumatic shock. The action of high and low temperatures. Radiation damage. Action of electric energy, influence of changes of atmospheric pressure</p>	2
Chapter 2 Reactivity of the organism. Pathophysiology of cells and tissues.		
3	<p>Reactivity and resistance. Importance of the nervous and endocrine systems for reactivity. Types of reactivity. Immunological reactivity. Allergies, allergic reactions and their types. Anaphylaxis. Significance of allergic reactions.</p>	2
4	<p>Causes and mechanisms of damage to cells, subcellular structures. Specific and nonspecific manifestations of cell damage. Dystrophies, types. Pathophysiology of tissue growth. Hyper- and hypobiotic processes. Hyperplasia. Regeneration. Atrophy, types. Necrosis. Tumors, classification. Metabolism in tumors. The effect of tumors on the body.</p>	2
Chapter 3: Pathophysiology of local blood circulation and microcirculation. Inflammation.		
5	<p>Typical microcirculation disorders. Arterial and venous hyperemia, their mechanism of occurrence and consequences. Stasis. Ischemia. Heart attack. Thrombosis and embolism, their classification, pathogenesis.</p>	2
6	<p>Inflammation, etiology, stages and signs. Pathogenesis of inflammation. Changes in the area of inflammation. Mediators of inflammation. Exudation and emigration of leukocytes, chemotaxis. See exudate. Classification and significance of inflammation for the body.</p>	2
Chapter 4: Pathophysiology of thermoregulation. Typical metabolic disorders.		

7	Hypothermia and hyperthermia. Fever, etiology and pathogenesis. Types of fever. Completion of fever. Changes in metabolism and physiological functions in fever, the importance of fever for the body. Types of starvation. Carbohydrate, protein and fat starvation. Classification of hypoxia. Causes and pathogenesis. Types of compensation for hypoxia.	2
8	Types of starvation. Carbohydrate, protein and fat starvation. Classification of hypoxia. Causes and pathogenesis. Types of compensatory reactions of an organism at hypoxia, and their value and influence at a course of oxygen starvation.	2
Chapter 5: Pathophysiology of blood, system blood circulation and respiration		
9	Blood Transfusion. Blood transfusion shock. Changes in the number and quality of erythrocytes. Anemia, their classification, etiology and pathogenesis. Changes in the number and quality of leukocytes. Leukocytosis and leukopenia, their types. Classification and reasons. Changes in blood clotting. Changes in blood density and viscosity, mechanical and chemical resistance of erythrocytes. Changes in ESR and WEM in pathology.	4
10	Circulatory failure. Heart failure. Myopathies, myocarditis, myocardial infarction. Coronary circulation disorders. Etiology, pathogenesis, consequences. Myocardial hypertrophy. Pericardial pathology. Dysfunction of the conduction system of the heart, arrhythmia. Hypertension, hypertension and hypotension. Shock, coma, collapse. Faint.	4
11	General characteristics of respiratory disorders. Disorders of lung ventilation: shortness of breath, sneezing, coughing, pathogenesis and classification. Disorders of the upper respiratory tract (bronchitis, pneumonia, edema, emphysema). Pleural dysfunction. Pneumothorax, hydrothorax.	4
Chapter 6: Pathophysiology of digestion and liver		
12	Appetite disorders and thirst. Digestive disorders in the oral cavity. Causes and consequences. Disorders of salivation and salivation. Disorders of swallowing, chewing gum and esophageal patency. Digestive disorders in the stomach and intestines. Causes and consequences. Changes in motility of the stomach and intestines. Traumatic reticulitis and reticulopericarditis. Disorders of the secretory activity of the pancreas.	4
13	Etiology and pathogenesis of liver dysfunction. Hepatitis, hepatosis and cirrhosis. Liver barrier dysfunction. Disorders of bile formation and bile secretion. Etiology and pathogenesis of jaundice (mechanical, parenchymal, hemolytic). Bile is a stone disease.	4
Chapter 7: Pathophysiology of the kidneys, systems reproduction and lactation		
14	Renal insufficiency. Nephrosis, nephritis, glomerulonephritis (etiology, pathogenesis, consequences). Diuresis disorders - polyuria, oliguria, anuria. Hypostenuria, isostenuria (etiology, pathogenesis). Uremia. Kidney stone	4

	disease.	
15	Violation of neuro-humoral mechanisms of reproduction in male and female animals. Violation of sexual activity. Etiology and pathogenesis of disorders of spermatogenesis and ovulation. Impaired fertilization and zygote formation. Impaired fetal development during pregnancy. Maternal effect. Exogenous and endogenous factors of lactation disorders. The role of neurohumoral factors, metabolic disorders and pathological processes in lactation disorders. Mastitis - etiology, pathogenesis, classification.	4
Chapter 8: Pathophysiology of endocrine and nervous system		
16	Etiology of nervous system dysfunction. Neuroses. Impaired excitability and conductivity. Synapse dysfunction (adrenergic and cholinergic), etiology, pathogenesis, and consequences. Impaired motor function of the nervous system. Hyperkinesia and hypokinesia. Cramps. Paresis. Paralysis. Sensitivity disorders. Pain. Dysfunction of the autonomic nervous system.	4
Total hours		48

3.3. Laboratory classes

№	The names of the topics and their summary	Number of hours
		Full time
Chapter 1: General nosology		
1	Definitions and methods of pathophysiology. Safety precautions when working in a pathophysiological laboratory. Regulations of classes and design of its materials. Connection of pathophysiology with other disciplines and future profession.	2
2	Investigation of the body's protective devices. Study of the pathogenesis of reflex respiratory arrest under the action of ammonia. Pathogenesis of the body's protective devices and their significance for the body's vital functions.	2
3	Study of the effect of low atmospheric pressure on the animal's body. Experimental "altitude sickness". Study of the etiology and pathogenesis of altitude sickness. Study of stages and their brief characteristics.	2
4	Study of stages and of the pathogenic effect of high temperature on the animal's body. Overheating (hyperthermia) of the body. Etiology and pathogenesis. Study of overheating stages and their brief characteristics.	2
Chapter 2 Reactivity of the organism. Pathophysiology of cells and tissues.		
5	Investigation of the basic functions of phagocytes. Study of the micro picture of the stages of phagocytosis. Characteristics of each stage of phagocytosis. Significance of phagocytosis for human and animal life.	2
6	Dependence of reactivity and resistance of the organism on the state of the nervous system during oxygen starvation. Study of the course of oxygen starvation in animals with different functional state of the CNS. Study of the sensitivity of various tissues to oxygen deficiency.	2
7	Determining the features of anaphylactic shock. Study of the course of anaphylactic shock in guinea pigs. Study of the etiology and pathogenesis of anaphylaxis. Danger of anaphylactic reactions for human and animal life.	2
Chapter 3: Pathophysiology of local blood circulation and microcirculation. Inflammation.		
8	Study of etiology, pathogenesis and clinical signs of arterial, venous hyperemia, ischemia and stasis. Study of the consequences of arterial, venous hyperemia, ischemia and stasis. Classification of hyperemia, ischemia and stasis.	2
9	Study of the etiology and pathogenesis of thrombosis and embolism.	2

	Study of the course and consequences of thrombosis and embolism. Classification of thrombosis and embolism. Experimental reproduction of thrombosis and embolism and consideration of stages of thrombus formation.	
10-11	Investigation of the causes and mechanism of inflammation. Classification of inflammation. Study of stages and external signs of the inflammatory process. The value of inflammation for humans and animals (favorable and unfavorable).	4
Chapter 4: Pathophysiology of thermoregulation. Typical metabolic disorders.		
12	Study of the pathogenesis of salt fever and its stages. Study in the dynamics of changes in body temperature, respiratory rate and heart rate in experimental salt fever. Biological significance of fever for the body.	2
13	Pathophysiology of basal metabolism. Investigation of basic metabolism by indirect calorimetry. Experimental reproduction of disorders of basal metabolism in laboratory animals by indirect calorimetry.	2
14	Disorders of carbohydrate metabolism. Hyper- and hypoglycemia. Diabetes. Study of the pathogenesis of hypoglycemic coma in laboratory animals. Consideration of stages and course of hypoglycemic coma in white mice.	2
15	Disorders of water-electrolyte metabolism. Edema and hydrocephalus, classification, pathogenesis and their significance. Etiology and pathogenesis of edema and hydrocephalus. Reproduction of experimental edema and study of its pathogenesis.	2
16	Classification of hypoxia. Causes and pathogenesis. Types of compensatory reactions of an organism at hypoxia, and their value and influence during oxygen starvation. Study of the etiology and pathogenesis of hypoxia in laboratory animals.	2
Chapter 5: Pathophysiology of blood, system blood circulation and respiration		
17	Etiology and pathogenesis of posthemorrhagic anemia. Hematological picture in posthemorrhagic anemia. Study of changes in the number of erythrocytes and hemoglobin concentration in experimental posthemorrhagic anemia.	2
18	The pathogenesis of experimental leukopenia and leukocytosis. Study of changes in the quantitative and qualitative composition of leukocytes in the blood in some pathological processes. Derivation of the leukogram of a sick animal and comparison with the leukogram is normal.	2
19	Investigation of changes in erythrocyte sedimentation rate (ESR) and osmotic resistance of erythrocytes (ORE) in experimental posthemorrhagic anemia. Etiology and pathogenesis of ESR and WEM disorders.	2
20	Research of heart rhythm disorders. Study of the pathogenesis of cardiac arrhythmias in violation of its automatism. Etiology and pathogenesis.	2

	Experimental reproduction of arrhythmias. Influence of arrhythmias on vital functions of an organism.	
21	Study of the pathogenesis of experimental extrasystoles of the heart. Study of changes in the heart during extrasystole. Classification of extrasystoles. Influence of extrasystoles on vital functions of an organism.	2
22	Study of the etiology and pathogenesis of major heart defects. Compensatory processes in heart failure. Changes in the physicochemical properties of the walls of blood vessels in vascular insufficiency. Violation of blood pressure regulation	2
23	Study of the main mechanisms of external respiration disorders, its causes and consequences. Classification of periodic respiration. Disorders of lung ventilation in pathology. Respiratory disorders in lung pathology.	2
Chapter 6: Pathophysiology of digestion and liver		
24	Study of changes in the acidity of gastric juice in experimental gastritis. Study of quantitative and qualitative changes in the secretion of gastric juice in pathology. Experimental reproduction of gastritis. Etiology and pathogenesis of gastritis	2
25	Study of the toxic effect of bile on the general condition of the body, on the reflex activity of the nervous system and on cardiac activity. Experimental reproduction of the toxic effects of bile on the body. Etiology and pathogenesis	2
26	Pathogenic effect of bile on the body with jaundice. Causes of liver failure. Impaired liver barrier function in pathology. Etiology and pathogenesis of liver failure in humans and animals. Experimental reproduction pathogenic effect of bile	2
Chapter 7: Pathophysiology of the kidneys, systems reproduction and lactation		
27	Changes in the composition and amount of urine in pathology of the kidneys. Pathological components of urine. Dysfunction of urination and urination. Etiology and pathogenesis of urinary disorders in humans and animals.	2
28	Study of major diseases and pathological processes of the kidneys. The concept of renal failure. Qualitative changes in urination in pathology. Etiology and pathogenesis of urinary disorders in humans and animals.	2
Chapter 8: Pathophysiology of endocrine and nervous system		
29	Study of the causes and mechanisms of disorders in the pathology of the hypothalamic - pituitary system. Study of the pathogenesis and main clinical signs of pathology of the hypothalamic-pituitary system in laboratory animals.	2
30	Study of the role of endocrine effects in changes in metabolism under stress. General adaptation syndrome. Study of pathogenesis and main clinical signs of adaptation syndrome in laboratory animals. Etiology	2

	and pathogenesis.	
31	Study of the influence of the functional state of the central nervous system and the nature of motor disorders in animals. Investigation of the pathogenesis and main clinical signs of experimental seizures in laboratory animals.	2
32	Investigation of the influence of dysfunction of individual parts of the reflex arc on the nature of motor function. Study of pathogenesis and main clinical signs of central and peripheral paralysis and paresis. Hypokinesia.	2
Total hours		64

3.4. Individual Work

№	The names of the topics and their summary	Num-ber of hours
		Full time
Chapter 1: General nosology		
1	The damaging effect of electricity. Pathogenic effect of chemical factors on the body. Feed poisoning of animals. Harmful effect of biological factors. Characteristics of local and general changes in the body under the influence of biological factors. Causes of hereditary diseases and pathogenesis of their development. Types of inheritance of diseases. The value of the maternal effect in pathology. The importance of the constitution, species, sex and age of animals in the occurrence and manifestation of diseases.	2
Chapter 2 Reactivity of the organism. Pathophysiology of cells and tissues.		
2	Barrier adaptations of the body. Phagocytosis. Immunological reactivity. Significance of allergic reactions for the diagnosis of infectious diseases of farm animals. Idiosyncrasy and its effect on the body.	3
3	General reactions of the body to cell damage. Damage to subcellular structures and their consequences. Tumors, causes and classification of tumors. Pathogenesis. Transplantation and its types. Etiology and pathogenesis.	3
Chapter 3: Pathophysiology of local blood circulation and microcirculation. Inflammation.		
4	Etiology, pathogenesis and clinical signs of stasis, ischemia. Infarct. Study of etiology, pathogenesis and clinical signs of arterial, heart attack. Study of the consequences of arterial, venous hyperemia, ischemia and stasis. Classification of hyperemia, ischemia and stasis.	2
5	Mediators of inflammation. See exudate. Study of stages and external signs of the inflammatory process. The value of inflammation for humans and animals (favorable and unfavorable). Changes in blood microcirculation in the area of inflammation.	2
Chapter 4: Pathophysiology of thermoregulation. Typical metabolic disorders.		
6	Classification and types of fevers. The value of fever for the body. Brief description and mechanism of development of the most common types of fever. Characteristics of each of the stages of fever, and changes in the body during it.	2
7	Metabolic disorders. Disorders of energy and basic metabolism. Disorders of carbohydrate metabolism. Hyper- and hypoglycemia. Diabetes. Disorders of fat metabolism. Ketosis. Fat infiltration. Adiposity. Disorders of protein metabolism. Disorders of nitrogen-containing compounds. Disturbances of acid-base balance. Acidosis and	4

	alkalosis. Disorders of water-electrolyte metabolism. Edema and hydrocephalus, classification, pathogenesis and their significance. Types of starvation. Carbohydrate, protein and fat starvation. Classification of hypoxia. Causes and pathogenesis. Types of compensation for hypoxia.	
Total for the 5 semester		18
Chapter 5: Pathophysiology of blood, system blood circulation and respiration		
8	Changes in total blood volume in pathology, their types and consequences. Disorders of body functions and compensatory phenomena in anemia. Violation of physicochemical properties of blood in pathology.	3
9	Causes and manifestations of impaired automaticity, conduction and excitability of the heart. Compensatory processes in heart failure. Changes in the physicochemical properties of the walls of blood vessels in vascular insufficiency. Violation of blood pressure regulation. Hypertension.	4
10	Disorders of lung ventilation in pathology. Respiratory disorders in lung pathology. Anoxaemia. Causes and pathogenesis of tissue respiration disorders. Significance of tissue respiration disorders for the body.	3
Chapter 6: Pathophysiology of digestion and liver		
11	Causes of digestive disorders in the oral cavity. Pathology of digestion in the pancreas of ruminants. Consequences of indigestion in the intestines. Dyspepsia of newborn animals, causes and pathogenesis.	2
12	Methods of studying liver function in pathology. Causes of liver failure. Impaired liver barrier function in pathology. Significance for the human body and animals of liver dysfunction. Etiology and pathogenesis.	2
Chapter 7: Pathophysiology of the kidneys, systems reproduction and lactation		
13	Dysfunction of urination and urination. The concept of renal failure. Dysfunction of urination and urination. Etiology and pathogenesis of disorders of urinary function in pathology. The types of disorders in animals.	2
14	The effect of castration on animals. Disorders of the secretory function of the gonads in females and males. Disorders of milk production, milk production and basic properties of milk. The main types of disorders.	2
Chapter 8: Pathophysiology of endocrine and nervous system		
15	General characteristics of endocrine disorders. Etiology and pathogenesis of endocrine disorders. Pathophysiology of the pituitary gland, thyroid gland. Dysfunction of the thyroid gland. Adrenal dysfunction. Pathophysiology of the pancreas. Diabetes. Stress and general adaptation syndrome.	3

16	Causes of nervous system dysfunction. Pathological parabiosis and pathological dominant. Pain, its pathogenesis and protective value for the body. Consequences of complete removal of the cerebral hemispheres.	2
General		43
Preparation for training sessions and control activities		55
Total hours		98

4. Teaching Methods

The study of the subject "Veterinary pathophysiology" is carried out using the following methods:

- teaching of lecture material;
- use of educational visual material (tables, diagrams, stands, models, slides, etc.);
- use of computer programs, videos, movies;
- solving situational tasks;
- conducting research on the functions of individual organs and organ systems and evaluating the results obtained;
- laboratory tests of blood, urine, milk and evaluation of the results obtained;
- Scientific research work;
- independent work of students.

The main types of training according to the curriculum are:

- lectures;
- laboratory work;
- independent student work outside the classroom (SMS).

The main purpose of the lecture course is the development of scientific medical thinking in students and its use for the evaluation of the clinical condition of the animal, increasing the theoretical level of knowledge of the functions of different organs and systems of organs of different species of domestic and other species of animals; to learn how to properly combine the results of generally clinical and complementary research methods, to think logically and to draw the right conclusions. Knowledge of Animal Physiology to be used to diagnose and provide medical assistance to various animal species.

Laboratory classes by the method of their organization are practical-oriented and include:

- study of the functions of different organs and systems in different species of animals;
- to learn to analyze the indicators found in the study of individual organs and systems (body temperature, pulse and respiratory rate, scar reduction, heart tones, blood pressure, etc.), the study of which is applicable in the clinical practice of a veterinarian.

Current knowledge control is conducted in laboratory classes according to the specific objectives of the current topic. The assimilation of each topic is monitored in the classroom (initial control - as the level of readiness for laboratory work and the final control of knowledge and skills acquired after conducting laboratory classes) through oral questioning or test control, solving situational tasks.

The final control of students' knowledge in Animal Physiology is carried out upon completion of the study material of all sections of the discipline during the exam session in the form of a semester exam. Final examination (examination) is allowed for students who have completed all types of work required by the curriculum.

5. Control methods

Assessment of student learning results is carried out by conducting current and final (examination) control of knowledge of the program material of the discipline.

The day-to-day knowledge control is carried out in laboratory classes according to the specific objectives of the current topic in the form of an oral survey or written express control or computer-based testing.

All laboratory classes provide objective control of theoretical training and control of mastering practical skills in the form of oral questioning or test control, solving situational problems. Knowledge of the material is controlled in the laboratory (initial control - as the level of readiness for laboratory activities and final control of the knowledge and skills acquired after the laboratory class).

Assessment of the knowledge of the program material of the students' independent work, which is foreseen to be studied along with the classroom work, is carried out during the current control of knowledge of the topic at the relevant classroom session, as well as during the final (examination) control.

The final control of students' knowledge in Pathological Physiology is carried out upon completion of the study material of all sections of the discipline during the exam session in the form of a semester exam. Final examination (examination) is allowed for students who have completed all types of work required by the curriculum.

6. Criteria of Students' Learning Results

Assessment of student learning results in Veterinary Pathophysiology is carried out by conducting current and final (test and exam) knowledge control. Assessment of student learning outcomes in each semester is made in points, the maximum number of which is 100.

The study of program material in "Veterinary Pathophysiology" will be conducted by students of the Faculty of Veterinary Medicine during the 1st and 2nd semesters. In the 1st semester of study "Veterinary Pathophysiology" students complete the final control of knowledge in the form of credit.

Transition credits are distributed as follows:

$$50 (CC)+ 50 (C) = 100$$

50 (CC) – 50 maximum points from current control (CC) that can recruit a student for the semester;

50 (C) – 50 maximum points a student can earn for the 2 colloquiums.

The current control (CC) of all the student's scores on running knowledge control is calculated with the following translation into points in the formula:

$$CC=(50 \times MAN)/5=10 \times MAN$$

MAN – mid arithmetic number of all marks that student can get during semester.

The results of credit of knowledge of program material in "Veterinary Pathophysiology" are evaluated on a four-point scale ("5", "4", "3", "2").

Table 1

Criteria for credit of students' knowledge

Evaluation	Evaluation criteria
«5», «4», «3» Satisfactory 3	Fully possesses educational material, freely independently and reasonably teaches it during oral presentations and written answers, thoroughly and comprehensively discloses the content of theoretical questions and practical / computational tasks, using normative, obligatory and additional literature. He has sufficient knowledge of the teaching material, justifies it during oral speeches and written answers, mainly reveals the content of theoretical questions and practical tasks, using normative and obligatory literature. The student is able to identify the essential features of the studied through the operations of synthesis, analysis, identify cause and effect relationships that may have some insignificant errors, form conclusions and generalizations, freely operate facts and information. In general, he possesses the educational material, sets out its main content during oral presentations and written calculations, but without deep comprehensive analysis, substantiation and argumentation, while leaving some material inaccuracies and mistakes.

«2» Unsatisfactory	Does not fully possess the educational material. Fragmentally, superficially (without argumentation and rationale), he presents it during oral speeches and written calculations, does not sufficiently disclose the content of theoretical questions and practical problems, while allowing significant inaccuracies, correctly solved separate calculation / test problems. Haphazard separation of random features of the studied; inability to perform the simplest operations of analysis and synthesis; make generalizations, conclusions.
-----------------------	--

Based on the results of the semester control of knowledge, the student is credited / unaccounted for on the national scale, and the number of points scored on the ECTS scale (Table 3).

Students complete the study of Pathological Physiology by conducting a final examination in the form of an exam.

The distribution of points for the final knowledge control (exam) for the disciplines that are completed by the EXAMINATION (including the "Animal Physiology") are as follows:

$$50 \text{ (CC)} + 50 \text{ (E)} = 100$$

50 (CC) – 50 maximum points from current control (CC) that can recruit a student for the semester; **50 (E)** – 50 maximum points a student can earn for the exam.

Exam points are credited to the student for answering the exam ticket questions.

The following types of tasks will be used in the various exam tickets:

- programmatic questions of theoretical nature - aimed at revealing students' theoretical knowledge;
- practical program questions - aimed at identifying students' skills;
- test questions - focused on identifying the basic concepts of the discipline.

Each examination ticket (option) will have six theoretical and practical program questions, to which the student must provide written full answers and 20 test papers. Correct answers to the test tasks are scored by 1 point, and the results of written answers to questions of theoretical and practical nature are evaluated on a 4-point scale ("5", "4", "3", "2") according to the requirements of the student knowledge assessment criterion (Table 2). Therefore, the maximum number of points that can be scored by the student in the exam is 50.

At the end of the 2nd semester, the current control (CC) of all the student's scores on running knowledge control is calculated with the following translation into points in the formula:

$$CC = (50 \times MAN) / 5 = 10 \times MAN$$

MAN – mid arithmetic number of all marks that student can get during semester.

Table 2

Criteria for current and examination assessment of students' knowledge

Evaluation	Evaluation criteria
5	Fully possesses educational material, freely independently and reasonably teaches it during oral presentations and written answers, thoroughly and comprehensively discloses the content of theoretical questions and practical / computational tasks, using normative, obligatory and additional literature. He solved all the tasks correctly. The student is able to identify the essential features of the studied through the operations of synthesis, analysis, identify cause and effect relationships, form conclusions and generalizations, freely operate facts and information.
4	He has sufficient knowledge of the teaching material, justifies it during oral speeches and written answers, mainly reveals the content of theoretical questions and practical tasks, using normative and obligatory literature. However, some questions are lacking in depth and argumentation, while some minor inaccuracies and minor errors are allowed. Correctly solved most of the test problems. The student is able to identify the essential features of the studied through the operations of synthesis, analysis, identify cause and effect relationships that may have some insignificant errors, form conclusions and generalizations, freely operate facts and information.
3	In general, he possesses the educational material, sets out its main content during oral presentations and written calculations, but without deep comprehensive analysis, substantiation and argumentation, while leaving some material inaccuracies and mistakes.
2	Does not fully possess the educational material. Fragmentally, superficially (without argumentation and rationale), he presents it during oral speeches and written calculations, does not sufficiently disclose the content of theoretical questions and practical problems, while allowing significant inaccuracies, correctly solved separate calculation / test problems. Haphazard separation of random features of the studied; inability to perform the simplest operations of analysis and synthesis; make generalizations, conclusions.

Each student score is matched by a national and ECTS score (Table 3).

Table 3

The scale of evaluation of student performance

100 points scale	On a national scale		ECTS
	Exam	Credit	
90 – 100	Excellent	Enrolled	A
82 – 89	Okay		B
74 – 81			C
64 - 73	Satisfactorily		D
60 - 63			E
35 - 59	Unsatisfactory (not counted) with the possibility of reassembly		FX
0 - 34	Unsatisfactory (not counted) with mandatory re-study of discipline		F

Students will get acquainted with the content of the course syllabus, the list of questions for the current and final (credit and examination) control of knowledge of the program material of the course not later than the second week of the beginning of the academic year.

Students who fail to fully complete the planned volume of study work, have not completed their missed labs and lectures are not allowed to take the final exam and exam.

7. Studying literature

1. Stojanovskij V.G., Kolotnickij V.A., Matsyuk O.I. Collection of physiological terms. Educational and methodical manual on "Veterinary pathophysiology" for students, the level of higher education "Magister" specialty 211 - "Veterinary Medicine". Lviv: Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, 2016. 40 p.

2. Stojanovskij V.G., Kolotnickij V.A. Pathophysiology of animals (general nosology). Methodical instructions on "Veterinary pathophysiology" for students, the level of higher education "Magister" specialty 211 - "Veterinary Medicine". Lviv: Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, 2016. 25 p.

3. Stojanovskij V.G., Kolotnickij V.A. Pathological physiology of blood circulation and respiration. Training manual on "Veterinary pathophysiology" for students, the level of higher education "Magister" specialty 211 - "Veterinary Medicine". Lviv: Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, 2016. 60 p.

4. Stojanovskij V.G., Kolotnickij V.A. Pathological physiology of digestion, liver and kidneys. Methodical instructions on "Veterinary pathophysiology" for students, the level of higher education "Magister" specialty 211 - "Veterinary Medicine". Lviv: Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, 2016. 28 p.

5. Stojanovskij V.G., Kolotnickij V.A. Pathological physiology of the endocrine and nervous systems. Methodical instructions on "Veterinary pathophysiology" for students, the level of higher education "Magister" specialty 211 - "Veterinary Medicine". Lviv: Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, 2016. 24 p.

6. Stojanovskij V.G., Kolotnickij V.A. General and special pathological physiology of animals. Educational and methodical manual on "Veterinary pathophysiology" for students, the level of higher education "Magister" specialty 211 - "Veterinary Medicine". Lviv: Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, 2017. 157 p.

7. Stojanovskij V.G., Kolotnickij V.A. Test tasks on veterinary pathophysiology of animals for self-control of FVM students. Educational and methodical manual on "Veterinary pathophysiology" for students, the level of higher education "Magister" specialty 211 - "Veterinary Medicine". Lviv: Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, 2018. 55 p.

8. Stojanovskij V.G., Kolotnickij V.A. General and special pathological physiology. Educational and methodical manual on "Veterinary pathophysiology" for students, the level of higher education "Magister" specialty 211 - "Veterinary Medicine". Lviv: Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, 2018. 90 p.

9. Stojanovskij V.G., Kolotnickij V.A. Collection of pathophysiological terms for FVM students. Educational and methodical manual on "Veterinary pathophysiology" for students, the level of higher education "Magister" specialty 211

- "Veterinary Medicine". Lviv: Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, 2018. 43 p.

10. Stojanovskij V.G., Kolotnickij V.A. General veterinary pathological physiology of animals. Educational and methodical manual on "Veterinary pathophysiology" for students, the level of higher education "Magister" specialty 211 - "Veterinary Medicine". Lviv: Stepan Gzhytskyi National University of Veterinary Medicine and Biotechnologies Lviv, 2018. 59 p.

8. Recommended Literature

Basic:

1. Dr.P.B.Reddy's. Text book of Animal Physiology. Book: 2015. 159 p.
2. Rowen D. Frandson, W. Lee Wilke, Anna Dee Fails. Anatomy and Physiology of Farm Animals. 2016. 536 p.
3. Richard W. Hill, Gordon A. Wyse, Amherst Margaret Anderson. Animal Physiology Third Edition: Printed in U.S.A. 2012. 985 p.
4. Floron C. Faries, Jr., DVM, MS. Anatomy & Physiology of Animals. 2013. 84 p.
5. Hafez B., Hafez E.S.E. Reproduction in Farm Animals. 7th ed. Baltimore, Lippincott: Williams & Wilkins, 2000. 150 p.
6. Pineda M.H. Veterinary Endocrinology and Reproduction. 5th ed. Ames: Iowa State University Press, 2001. 450 p.
7. Pollard, T.D., and W.C. Earnshaw. Cell Biology. Philadelphia. 2004. 250 p.
8. Reece W.O. Functional Anatomy and Physiology of Domestic Animals. 3rd ed. Baltimore: Lippincott, Williams & Wilkins. 2005. 380 p.
9. Swenson M.J., W.O. Reece, eds. Dukes' Physiology of Domestic Animals. 11th ed. Ithaca, N.Y., Comstock Publishing Associates, 1993. 300 p.
10. Tortora G.J., B. Derrickson. Principles of Anatomy and Physiology. 11th ed. Hoboken, N.J., John Wiley & Sons. 2006. 266 p.

Auxiliary:

1. Bacha W.J. and L.M. Bacha. Color Atlas of Veterinary Histology. 2nd ed. Baltimore: Lippincott Williams & Wilkins, 2000. 149 p.
2. Berne R.M., and M.N. Levy. Principles of Physiology. 3rd ed. St. Louis: Mosby, 2000. 180 p.
3. Bertone J. and C.M. Brown. The 5-Minute Veterinary Consult Equine. Baltimore: Lippincott, Williams & Wilkins, 2001. 285 p.
4. Boron W.F. and E.L. Boulpaep. Medical Physiology. 2nd ed. Philadelphia: W.B. Saunders, 2009. 199 p.
5. Akers R.M., Denbow D.M. Anatomy and Physiology of Domestic Animals. USA: Wiley-Blackwell Publ., 2008. 624 p.
6. Ganong W.F. Review of Medical Physiology. New York: Lange medical Books McGraw-Hill, 2001. 732 p.

9. Information resource.

1. Pathophysiology URL: <https://www.medscape.com/answers/429816-199504/what-is-the-pathophysiology-of-the-rejection-process-following-heart-transplantation>
2. Pathophysiology – Definition, Major and History | Biology Dictionary. URL: <https://www.sciencedirect.com/topics/medicine-and-dentistry/pathophysiology>
3. A Review of the Pathophysiology, Classification, and Treatment. URL: <https://clinical.diabetesjournals.org/content/27/2/52>
4. Animal pathophysiology – Latest research and news. Nature. URL: <https://www.nature.com/subjects/animal>
5. Pathophysiology – the carter center. URL: https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/nursing_students/In_pathophysiology.pdf
6. 100 Case Studies in Pathophysiology. URL: <http://repository.akbidrspad.ac.id/71/1/100%20Case%20Studies%20in%20Pathophysiology-532hlm%20%28warna%20hanya%20cover%29.pdf>
7. Animal Pathophysiology – Oxford University Press. URL: <https://global.oup.com/academic/category/science-and-mathematics/biological-sciences/zoology-and-animal-biology/animal-physiology/?cc=us&lang=en&>
8. Update on diagnosis, pathophysiology, and management of disease URL: <https://onlinelibrary.wiley.com/journal/14390396>