SILABUS OF THE EDUCATIONAL COMPONENT

PATHOLOGICAL PHYSIOLOGY

Specialty	**211 Veterinary Medicine**	**Compulsory nature of the discipline**	**mandatory**
Educational program	**Veterinary Medicine**	**Faculty**	**Veterinary Medicine**
Educational level	**Second (master's) level**	**Department**	**Animal Physiology and Biochemistry**

TEACHER

Zhukova Irina Alekseevna

Higher education – specialty: veterinary medicine
Scientific degree – Doctor of Veterinary Sciences, 16.00.04 Veterinary Pharmacology and Toxicology
Academic title – Professor of the Department of Animal Physiology and Biochemistry
Work experience – more than 35 years
Indicators of professional activity on the course topic:

- **author of more than 20 methodological developments;**
- **co-author of more than 10 thematic publications;**
- **participant in scientific and methodological conferences.**

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The following are involved in teaching the discipline:

GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT (DISCIPLINE)

Obgective	**formation of theoretical knowledge and practical skills for understanding the basic concepts of general nosology, the role of pathological factors of the external and internal environment and protective and compensatory means in the development of the disease, analysis of typical pathological processes and diseases, their general patterns of development and completion, as well as the role of etiological and pathogenetic prevention and therapy. The main task of the academic discipline "Pathological Physiology" is to instill in students medical thinking.**
Format	**lectures, laboratory classes, independent work, individual assignments (abstracts).**
Detailing of learning outcomes and forms of their control	• **The ability to think abstractly, analyze and synthesize, conduct research at the appropriate level, learn and master modern knowledge, develop strategies for safe, sanitary-conditioned animal husbandry, know the terminology of pathophysiology, be able to use it correctly in their work (GC1, GC2, SC2, PLO1) / individual practical classes.** • **The ability to apply knowledge in practical situations, make informed decisions, communicate with representatives of other professional groups at different levels, formulate conclusions regarding the effectiveness of selected methods and means of keeping, feeding and treating animals, prevention of infectious and non-infectious diseases , as well as production and technological processes at enterprises for keeping, breeding or operating animals (GC1, GC2 , SC1, SC3, PLO2) / individual practical classes.** • **Ability to use tools, special devices, instruments, laboratory equipment and other technical means to carry out the necessary manipulations during professional activities, develop quarantine and health measures, methods of therapy, prevention, diagnosis and treatment of diseases of various etiologies, carry out educational activities among industry workers and the population (GC1 , GC2, SC1, SC2, SC5, PLO2 , PLO3) / individual practical classes.** • **implementation of environmental protection mechanisms, application of knowledge of biosafety, bioethics and animal welfare in professional activities, knowledge of the rules and requirements of biosafety, bioethics and animal welfare in the process of professional activities (GC2, SC1, SC2, SC5, PLO1, PLO3) / individual practical classes.**
Scope and forms of control	**8 ECTS credits (240 hours): 32 hours of lectures, 96 hours of laboratory work, 112 hours of independent work; current control (4 sections); final control - exam.**
Teacher requirements	**timely completion of tasks, activity, teamwork.**
Enrollment conditions	**"free enrollment"**

COMPLIANCE WITH THE EDUCATION STANDARD AND EDUCATIONAL PROGRAM

Competencies	**GC1. Ability for abstract thinking, analysis and synthesis** **GC2. Ability to apply knowledge in practical situations** **SC1. 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** **SC2. Ability to use tools, special devices, instruments,**	**Program learning outcomes**	**PLO1. Know and correctly use the terminology of veterinary medicine** **PLO2. Use information from domestic and foreign sources to develop diagnostic, treatment, and business strategies.** **PLO3. Determine the essence of what occurs in the animal body in normal and pathological conditions**

	laboratory equipment and other technical means to perform the necessary manipulations during professional activities SC5. The ability to apply methods and techniques of pathological diagnosis of animal diseases to establish the final diagnosis and causes of their death.		

STRUCTURE OF THE EDUCATIONAL COMPONENT (DISCIPLINE)

Chapter 1. Pathophysiology as a science. Nosology. Pathophysiology of reactivity and immunity. Disorders of peripheral circulation and microcirculation.

Lecture 1.	Pathophysiology as a science. General doctrine of disease as a higher form of pathology. General nosology.	Laboratory class 1 (LC 1)	Experiment as the main method of studying pathophysiology.	Independent work	1. The main historical stages of the development of pathophysiology. Pathogenetic influence on the body of physical factors: ultraviolet, X-ray and ionizing radiation, laser, atmospheric pressure. Etiotropic principle of prevention and therapy. Pathogenetic principle of therapy. 2. The main mechanisms of cell damage. Hereditary animal diseases caused by gene mutations. Changes in the body during aging. 3. Reactivity and resistance. The importance of the nervous, endocrine, and immune systems in shaping the body's reactivity. Infectious process. Antibodies, their significance, structure and classification. Immunity. Types of immunity. Mechanisms of immune response formation. Immunological tolerance. Immunological memory. Delayed-type allergic reactions. Autoallergy. Paraallergy. Idiosyncrasy. Intravascular disorders. Etiology and pathogenesis of the development of the sludge phenomenon. Impaired permeability of exchange
		LC 2	The effect of pathogenic environmental factors		
Lecture 2.	Pathophysiology of the cell	LC 3	Pathophysiology of the cell. Changes in the physicochemical properties of tissues during damage. Apoptosis.		
Lecture 3.	Reactivity of the body and its significance in pathology Violation of the body's immunological reactivity. Immunodeficiencies. Pathological immunological tolerance. Allergy.	LC 4	Nonspecific factors of body defense. Barrier adaptations.		
		LC 5	Allergy. Anaphylactic shock and Arthus phenomenon.		
		LC 6	Phagocytosis. Infectious process.		
Lecture 4.	Pathophysiology of peripheral circulation and microcirculation. Etiology and pathogenesis of the main pathologies of the peripheral blood system (arterial, mixed and venous hyperemia, ischemia, stasis, thrombosis, embolism). Typical microcirculation disorders.	LC 7	Peripheral circulation and microcirculation disorders. Hyperemia, ischemia, infarction.		
		LC 8	Peripheral circulation and microcirculation disorders, embolism, stasis, thrombosis.		
		LC 9	DIC syndrome (disseminated intravascular coagulation syndrome) intravascular coagulation). DIC syndrome in animals.		
		LC 10	Rheological properties of blood and their role in microcirculation disorders.		
		LC 11	Test control work, solving situational problems.		

					vessels. 4. Extravascular disorders. Mechanisms of stopping bleeding. Causes of blood clotting disorders. Thrombophlebitis, varicose veins. Etiology and pathogenesis
Chapter 2. Typical pathological processes. Inflammation. Pathophysiology of thermal regulation. Fever. Pathology of tissue growth. Tumor growth. Pathology of metabolism and energy					
Lecture 5.	Inflammation Etiology and pathogenesis of inflammation. The main phases of the inflammatory process: alteration, exudation, proliferation. Types of inflammation. Inflammatory mediators. Vascular changes in acute inflammation Types of exudate and corresponding classification of inflammation. Features of inflammation in different animal species	LC 12	Experimental modeling of inflammation. Vascular changes in the inflammatory process	Independent work	1. Describe the main theories explaining the genesis and significance of inflammation for the body. The role of I. I. Mechnikov in the study of inflammation. Chemotaxis factors. Neuroendocrine and immune mechanisms of regulation of the inflammatory process. What are the features of the development of inflammation in animals of different species? 2. The dependence of the nature of the febrile reaction on the state of the nervous system. 3. What changes occur in the body during aging? 4. Fasting, its types. Complete fasting (causes, pathogenesis and main manifestations, metabolism, organs and systems during fasting). Incomplete fasting (causes, pathogenesis and main manifestations). Partial fasting (carbohydrate, protein, fat, vitamin, etc.). Therapeutic fasting, diet therapy.
		LC 13	Types of exudate. Properties of purulent exudate		
		LC 14	Mechanisms of proliferation. Proliferative type of inflammation. Productive inflammation, its types		
Lecture 6.	Fever Definition of the concept of fever; general characteristics. Etiology and pathogenesis. Mediators of the febrile process. The role of interleukins as pyrogenic factors. Types of febrile reactions. Termination of fever. Lysis and crisis.	LC 15	Features of basal metabolism in laboratory animals in case of fever Pyrogenic substances as the main criterion for the occurrence of a febrile reaction		
		LC 16	Study of the features of neurohumoral regulation in the development of the febrile process.		
Lecture 7.	Pathology of tissue growth. Tumors.	LC 17	Causes and classification of hypo- and hyperbiotic processes. To study the mechanisms of regeneration and the causes of their disruption.		
		LC 18	Tumors. Microscopic examination of tumor smears. Classification of tumors by tissue type. Pathogenesis of the tumor process.		
Lecture 8.	Pathophysiology of metabolism. Violations of protein, fat,	LC 19	The effect of tumors on the body. Tumors from epithelial, nervous, and		

	carbohydrate, vitamin, mineral and water-salt metabolism.		melanin-forming tissue. Multimedia demonstration of tumor development		
		LC 20	Violation of basic metabolism, Disturbances in water and electrolyte metabolism. Edema.		
		LC 21	Disturbances in the metabolism of proteins, carbohydrates and lipids.		
		LC 22	Test control work, solving situational problems.		
Chapter 3. Pathophysiology of organs and systems (blood, circulation, respiration)					
Lecture 9.	Pathological physiology of the blood system General characteristics of blood system dysfunction. Changes in total blood volume. Changes in the quantitative and qualitative composition of erythrocytes. Anemias. Principles of classification of anemias. Etiology and pathogenesis. Blood picture in case of anemia. Functional disorders and compensatory phenomena in anemia.	LC 23	Pathophysiology of the blood system. Determination of quantitative blood parameters (erythrocytes and hemoglobin) using a spectrophotometer. Determination and analysis of hematocrit.	Independent work	1. Etiology and pathogenesis of blood loss. Compensatory (urgent and long-term) mechanisms in case of blood loss. Blood transfusion. Hemotransfusion shock. Violations of hemostasis. Hemophilia and features of its manifestation in animals. Violation of the blood coagulation process in leukemia (hemorrhagic syndrome). Pathology of platelets. Etiology and pathogenesis of thrombocytopathies. Changes in the physicochemical properties of blood. 2. Impaired functions and reactivity in leukemia. 3. Myocardial fatigue due to its overload with excess volume and additional resistance to blood ejection. Neurogenic damage to the heart. Coronarogenic and non-coronary damage to the myocardium. Circulatory insufficiency in case of impaired blood flow to the heart. Violation of the physicochemical properties of blood vessels. Hypotension. Atherosclerosis. Determination of total cholesterol in
		LC 24	Red blood cell parameters in various pathologies. Study of quantitative and qualitative changes in erythrocytes in anemia. Microscopic studies of animal blood smears in various pathologies.		
Lecture 10.	Pathological physiology of the blood system. Changes in the quantitative and qualitative composition of leukocytes. Leukocytosis and leukopenia, their types. Blood picture in case of leukocytosis and leukopenia. Leukosis, their definition and classification, etiology and pathogenesis. Blood picture in case of leukemia. Violations of blood cell functions and changes in reactivity in leukemia.	LC 25	Changes in white blood cell parameters in various diseases. Study of changes in the quantitative and qualitative composition of leukocytes. Determination of leukoformula. To analyze the blood leukograms of different animal species in the case of various forms of leukocytosis and leukopenia.		
		LC 26	Study of the blood picture in various forms of leukemia. Changes in white blood cell counts in leukemia.		

Lecture 11.	**Pathological physiology of the circulatory system** **General characteristics of circulatory system disorders.** **Heart and vascular circulatory failure, etiology and pathogenesis .** **Physiological and pathological myocardial hypertrophy. Tonogenic and myogenic dilation. Causes and manifestations of arrhythmia. Types of arrhythmias.**	**LC 27**	**Pathophysiology of the circulatory system. Heart failure.**		**the blood serum of animals. Study of the causes and mechanisms of the development of hypo- and hypertension. Pathology of the pericardium.** **4. Respiratory function disorders caused by pathological changes in the structure and damage to the chest and respiratory muscles. Respiratory disorders due to impaired perfusion. lung functions. The effect of hypoxia on the function of the nervous, cardiovascular, respiratory and excretory systems.**
		LC 28	**Pathophysiology of the circulatory system. Cardiac arrhythmias.**		
		LC 29	**Etiology and pathogenesis and clinical manifestations of coronary heart disease in animals. Compensation for coronary heart disease.**		
Lecture 12.	**Pathological physiology of the respiratory system** **Acute and chronic respiratory failure. Respiratory regulation disorders. Shortness of breath. Respiratory disorders caused by lung damage. Dysfunction of the pleura, respiratory muscles, internal respiration: impaired oxygen transport and cellular respiration. Respiratory failure.**	**LC 30**	**Pathophysiology of the respiratory system. External respiration disorders. Types of dyspnea. Respiratory failure Atelectasis, emphysema and pneumothorax**		
		LC 31	**Current control (writing test tasks)**		
Chapter 4. Pathophysiology of organs and systems (digestive, liver, kidney, nervous and endocrine systems)					
Lecture 13.	**Pathological physiology of the digestive system.** **The main manifestations of digestive pathology. Appetite disorders, thirst. Digestive disorders in the oral cavity, single-chamber stomach and abomasum.** **Stomach ulcer.** **Digestive disorders are associated with impaired secretion of bile and pancreatic juice.** **Pancreatitis. Intestinal dysfunction.**	**LC 32**	**Pathophysiology of the digestive system. Gastric digestion disorders**	**Independent work**	**1. Digestive disorders in the oral cavity. Main pathological processes in the oral cavity** **Gastric and duodenal ulcer (etiology and pathogenesis).** **Hormones of the digestive system, disorders of their regulatory functions (make a table).** **Digestive disorders in the ruminant antrum. Disorders of fermentation of the contents in the antrum: causes and consequences. Changes in the motor function of the antrum. Ruminal overflow. Tympania. Disorders of the antrum function in case of traumatic reticulitis.**
		LC 33	**Disturbances in pancreatic secretion, bile secretion, and intestinal juice secretion.**		
		LC 34	**Disorders of bile secretion and intestinal juice secretion.**		
		LC 35	**Test control work, solving situational problems.**		
Lecture 14.	**Pathological physiology of the liver.**	**LC 36**	**Study of liver functional parameters in liver diseases.**		

	Etiology and pathogenesis of liver diseases. Disturbances of metabolic, protective, and bile-forming functions of the liver. Classification, etiology and pathogenesis of jaundice. Choleic and acholic syndromes, dyscholia.	LC 37	Pathogenesis of various types of jaundice in animals.		Pancreatic dysfunction. Causes and types of pancreatitis. 2. Violation of the barrier function of the liver. The effect of bile components on the body in mechanical jaundice. Gallstone disease. 3. Disturbances of neurohumoral regulation of urine formation and excretion. Extrarenal and renal factors of kidney damage. Pathogenesis of renal edema. Causes and mechanisms of development of urolithiasis in animals. Consequences of impaired non-diuretic kidney functions (arterial hypertension, anemia, blood coagulation disorders). Mechanism of renal hypertension. Quantitative and qualitative indicators of impaired diuresis. 4. Nerve trophism and dystrophic process. Biochemical, structural and functional changes in denervated tissues. Nervous disorders in poisoning with neurotropic substances of various origins. Pathological pain, its significance for the body. Antinociceptive system, its significance in the pathogenesis of diseases. 5. Endocrine disorders in animals. Dysfunctions of the hypothalamus, pituitary gland, pineal gland. Dysfunctions of the thyroid gland and parathyroid glands. Dysfunctions of the adrenal glands. Dysfunctions of the gonads.
		LC 38	Inflammatory and dystrophic processes in the liver (hepatitis, hepatosis, cirrhosis).		
		LC 39	Gallstone disease, etiology and pathogenesis.		
		LC 40	Test control work, solving situational problems.		
Lecture 15.	Pathological physiology of the kidneys. General characteristics of kidney dysfunction. Impaired function of the glomeruli of nephrons and tubules, filtration, reabsorption, secretion and excretion processes. The concept of renal failure. Acute and chronic renal failure. General characteristics of the main syndromes and diseases of the kidneys.	LC 41	Pathophysiology of the urinary system and kidneys. Renal dysfunction in nephritis and nephrosis. Renal failure. Uremia.		
		LC 42	Urolithiasis. Cylindruria. Types of cylinders.		
		LC 43	Test control work, solving situational problems.		
Lecture 16.	Pathophysiology of the nervous and endocrine systems. Common causes of nervous system dysfunction. Disturbances in the function of nerve cells, conductors, inhibitory, adrenergic and cholinergic synapses. Pathological parabiosis and dominant. Disorders of motor and sensory function of the nervous system. Disturbances of higher nervous activity. Neuroses in animals.	LC 44	Pathophysiology of the nervous system. Functional disorders of nervous activity Sensory and motor disorders in nervous pathologies, multimedia demonstration.		
		LC 45	Nervous complications in various pathologies in animals.		
		LC 46	Pathophysiology of the endocrine system. Causes and pathogenesis of endocrine disorders in animals.		
		LC 48	Test control work, solving situational problems.		

BASIC LITERATURE AND METHODOLOGICAL MATERIALS

Literature	1. Zhukova I.O. Lecture notes on pathological physiology for students of higher education in specialty 211 "Veterinary medicine": DBTU, 2022. 420 p . 2. Zhukova I.O., Denisova O.M., Bobrytska O.M., Kostyuk I.O., Kochevenko O.S., Vodop'yanova L.A., Yugai K.D. Pathological physiology: an explanatory dictionary. Kharkiv: Publishing house of the Municipal Printing House, 2023. 239 p. 3. Bereznyakova A.I., Kuznetsova V.M., Filimonova N.I., Bereznyakova M.E., Tyshchenko I.Yu. Pathological physiology: Textbook for students of higher pharmaceutical schools and pharmaceutical faculties higher medical educational institutions. Kh.: Publishing house of the National University of Physics and Technology : Golden Pages, 2003. 424 p. 4. Zaiko M.N., Byts Yu.V., Kryshtal M.V. and others. Pathophysiology: textbook (Higher Education University III-IV r. a.); ed. M.N. Zaiko , Yu.V. Byts, M.V. Kryshtal . 6th ed., revised and supplemented . Kyiv: "Medicine", 2017. 736 p. 5. Ataman O.V. Pathophysiology: in 2 vols. T1. General pathology: a textbook for students of higher educational institutions, 3rd edition. Vinnytsia: "New Book", 2006. 584p. 6. Ataman O.V. Pathophysiology: in 2 volumes. T2. Pathophysiology of organs and systems: a textbook for students . Higher education institutions 3rd edition. Vinnytsia: "New Book", 2019. 448 p. 7. Kryshtal M. V., Gozhenko A. I., Sirman V. M. Pathophysiology of the kidneys: a textbook . Odessa : Phoenix, 2020. 144 p. 8. Kostenko V.O., Akimov O.E., Yelinska A.M., Kovaleva I.O. Pathophysiology of the Blood System : Textbook. Lviv, 2022. 164 p.	**Methodological support**	1. Zhukova I.O., Kostyuk I.O., Kochevenko O.S., Bobrytska O.M., Vodop'yanova L.A., Antipin S.L., Yugai K.D. Pathological physiology. Workbook for laboratory and practical classes /., – Kharkiv: DBTU, 2023. – 112 p. 2. Mazurkevich A.Y. Danilov V.B., Kuts N.V. Pathophysiology of animals. Workshop. K.: Meta, 2003. 176 p., ill . 3. Manual for practical classes in pathological physiology / Edited by Yu.V. Byts , L.Ya. Danilova . – K.: Zdorovya., 2001. Multimedia demonstration.

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 to test questions
		up to 30	30 % - the result of mastering the block of independent work
		up to 40	40 % - student activity in class (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.