Code of subject	M_WE_SEM 5 PZTOFIZJ 1
Field of study	Veterinary Medicine
Name of the training module including the Polish name	Pathophysiology 1 Patofizjologia 1
Language of instruction	English
Type of the training module	Obligatory
Level of the training module	Master level
Form of studies	Full-time
Year of studies	III
Semester of studies	5
Number of ECTS credits	6 (3,0/3,0)
Name and surname of the person in charge	Dr hab. Urszula Kosior-Korzecka, Assoc. Prof.
Unit offering the subject	Sub-Department of Pathophysiology, Department of Preclinical Veterinary Sciences, Faculty of Veterinary Medicine
Aim of the module	The aim of the module is to familiarize students with etiology and pathomechanisms of animal diseases. Acquisition of the knowledge and practical skills regarding body systemic responses (e.g. inflammation, stress, atherosclerosis, water and electrolyte imbalance, and acid-base, repair, aging). Understanding the pathogenesis of selected metabolic, endocrine, immunological, neoplastic and genetic diseases at the molecular, cellular, organ and systemic levels in individual animal species, including causal therapy.
Learning outcomes – the total number of learning outcomes may not exceed (4-8) for the module. The description of the intended learning outcomes that a student should achieve after the completion of the module should be provided. The outcomes for all forms of classes used should be presented.	Konwledge:
	Student: K1. knows and understands basic pathological processes, including inflammation, cancer, acid-base balance disorders, genetic, nervous, metabolic, circulatory and respiratory disorders in animals and is able to determine their importance in the course of the disease
	K2. knows and understands the causes and explains the basic pathomechanisms of metabolic, endocrine and free radical-induced diseases at the molecular, cellular, organ and systemic levels, taking into account biological mechanisms enabling recovery. Knows and interprets the role of signaling molecules and receptor proteins in the pathomechanisms of cancer and genetic diseases.
	K3. knows and understands the relationship between the etiopathogenesis of diseases of the gastrointestinal, circulatory, respiratory, genitourinary systems and methods of their target therapies.
	Skills:
	Student: S1 - can analyze, evaluate and use the knowledge of the pathogenesis of a given disease in the process of selecting the appropriate target therapy
	S2 - can analyze and interpret the results of laboratory experiments performed in the field of etiology and pathogenesis of animal diseases

	S3 - can use selected molecular and cellular laboratory techniques, the results of which are used to analyze the etiology, pathomechanism and target therapy of diseases
	Social competences:
	Student: SC1. is ready to learn and improve skills throughout his life in connection with continuous progress in biomedical sciences
	SC2. is ready to work individually and in a team, as well as cooperate and perform entrusted tasks
Preliminary and additional requirements	Passed exams in *Biochemistry* and Animal *Physiology*

Contents of the training module – a compact description	LECTURES: Basic concepts and terms related to health, disease and etiopathogenesis of disease. Types of pathological mechanisms on examples of selected diseases. The inflammation process - etiology, molecular mechanisms of inflammation in the vascular and cellular phase. Parameters that allow to assess the advancement and spreading this process. Examples of diseases conditioned by the inflammation process. Repair and regeneration. Aging and longevity mechanisms. Genetic susceptibility and resistance to diseases. Pathogenesis of selected single-gene, multi-gene and chromosome diseases in animals and the basic methods used in their diagnosis. Etiopathogenesis of neoplastic diseases in animals. Molecular mechanisms of neoplasia with particular regard to tumor markers, tumor classification and differentiation, tumor grading. Relationship between the stage of pathogenesis and clinical symptoms. Cellular response to stress and pathogenic consequences of stress. Eustress and distress - distress symptoms and markers. Impact of stress on pain perception and food intake. Species-related differences in stress symptoms. Acid-base disturbances in animals - etiology, classification, compensatory mechanisms. Impact of acid-base balance disorders on the circulatory system and central nervous system. Changes in the anion gap, strong ion difference and strong ion gap values in the course of metabolic diseases, diseases of the digestive system and circulatory diseases. Using of diet cation-anion difference modification in the prevention and therapy of animal diseases. Pathogenesis of atherosclerosis, including disorders in the metabolism of individual lipoprotein fractions. CLASSES: Sources of free radicals and mechanisms of their influence on cellular structures. Oxidative stress. Enzymatic and non-enzymatic antioxidative mechanisms. Role of free radicals in the pathogenesis of cancer, metabolic diseases and circulatory disorders. The inflammation process - symptoms, plasma and cellular mediators of inflammation. The molecular mechanism of the vascular phase of the inflammation process. Cellular inflammation phase - molecular mechanisms responsible for marginalization, cell adhesion, diapedesis, chemotaxis and phagocytosis. Selected genetic diseases in animals. Analysis of karyotype changes in the course of chromosomal disorders in reproductive cells. Mechanisms of cancer and metastasis. Pathogenesis, hormonal and metabolic mechanisms of ketoacidosis and cancer cachexia. Analysis of selected markers of tumorigenic process and negative acute phase proteins in blood plasma. Stress - etiology, types and stages of stress. Acid-base disturbance in animals - determining the value of anion gap to differentiate and pre-diagnose individual types of metabolic acidosis and alkalosis. Respiratory acid-base disturbance in animals. Selected transfer proteins, apolipoproteins, cholesterol and the activity of HDL-related enzymes in atherosclerosis.

Recommended and obligatory reading list	Notes from lectures and classes, selected scientific publications. References: 1. Norman F., Cheville : Introduction to veterinary pathology 2. Slauson D.: Mechanisms of disease - a textbook of comparative general pathology 3. Sherbet G., Lakshimi M.: The genetics of cancer
The intended forms/activities/ teaching methods	Lectures, classes, labs, practical work, demonstration, presentation

Methods of verification and documentation forms of the achieved learning outcomes	The presence of the student during the classes is obligatory. During the semester, the student may miss 1 practical exercise. At the end of the semester or at another date set by the teacher, the student must complete the practical part of missed class and / or demonstrate an appropriate level of substantive preparation in the field of the material covered by this class. A workbook on Pathophysiology should be kept exclusively for this subject. It should contain plans for individual classes and protocols of practical classes performed along with the results of the tests/ experiments and their interpretation. Verification of learning outcomes in terms of practical skills and social competences: During the course, the student must perform a practical classes (individually, in pairs or in a group), calculate the results, if possible, present them in a graphic version, interpret them based on the knowledge of the subject of the etiopathogenesis of the disorders / diseases in question and draw appropriate conclusions (usually the student must indicate which of the analyzed samples is from a healthy / control animal and which is from an affected / experimental one and justify her/ his decision. All these elements must be described by the student in the workbook on Pathophysiology. Correct carring out of all the above-mentioned tasks is the basis for passing the practical exercises. Verification of learning outcomes in terms of knowledge, practical skills and social competences: In the first semester, three series of classes are carried out. After completing each cycle of practical classes, the credit is performed. Participation in the credit of the classes is possible only after passing the practical part from a given cycle. In each semester, two credits are oral and one is written. The result of each credit is a grade (5.0; 4.5; 4.0; 3.5; 3.0; 2.0) determined in accordance with the provisions in the Department's Education Quality Book. The student is entitled to 3 credit terms: - the first - on the date indicated in the classes schedule (the only possibility to change the date is an earlier date); - the second - within the next 7 days at the agreed date with the teacher; - the third - at the end of the semester (common for all groups after agreeing the date with the person responsible for the item). Students who fail to pass the credit within the prescribed period will receive unsatisfactory grades (2.0) (except for a sick leave or a very important random reason). Forms of documenting the achieved learning outcomes: written credits, the written part of the exam, protocols of practical exercises (in student notebooks).

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<tr><td>Balance of ECTS credits</td><td>Contact hours
<table><tr><td></td><td>Number of hours</td><td>ECTS</td></tr><tr><td>Lectures</td><td>20</td><td>0,8</td></tr><tr><td>Classes</td><td>30</td><td>1.2</td></tr><tr><td>Consultation</td><td>5</td><td>0.2</td></tr><tr><td>Credits/retake credits</td><td>18</td><td>0.8</td></tr><tr><td>In total:</td><td>73</td><td>3,0</td></tr><tr><td>Non-contact hours</td><td></td><td></td></tr><tr><td>Preparation for classes</td><td>28</td><td>1,2</td></tr><tr><td>Preparation of reports from practical classes</td><td>15</td><td>0.6</td></tr><tr><td>Studying the literature</td><td>30</td><td>1,2</td></tr><tr><td>In total:</td><td>73</td><td>3,0</td></tr></table></td></tr>
<tr><td>The workload related to the classes requiring direct participation of academic teachers:</td><td><table><tr><td></td><td>Number of hours</td><td>ECTS</td></tr><tr><td>Lectures</td><td>20</td><td>0,8</td></tr><tr><td>Classes</td><td>30</td><td>1.2</td></tr><tr><td>Consultation</td><td>5</td><td>0.2</td></tr><tr><td>Credits/retake credits</td><td>18</td><td>0.8</td></tr><tr><td>In total:</td><td>73</td><td>3,0</td></tr></table></td></tr>
<tr><td>Relationship between subject learning outcomes and veterinary studies learning outcomes</td><td>K1 - WE_W06++,WE_W07++,WE_W09++ WE_W05+ WE_W04+
K2 - WE_W06++, WE_W07++,WE_W09++ WE_W05+ WE_W04+
K3 - WE_W06++, WE_W07++,WE_W09++ WE_W05+ WE_W04+
S1 – WE_U25+
S2 – WE_U19++
S3 - WE_U19++
Sc1 – WE_K6+++
Sc2 – WE_K5++</td></tr>
<tr><td>Impact of selected compounds to final grade</td><td>The condition for passing semester I is attendance at the classes, passing of all practical classes provided for in the schedule for this semester and positive grades from all credits. The final grade for the 1st semester is the grade average from three credits.</td></tr>
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