Module title:	Pathophysiology	ECTS	10,0
Polish translation:	Patofizjologia		
Course:	**Veterinary Medicine**		

Module language: English		Stage: JM-FVM	
Form of studies: ☒ intramural ☐ extramural	Type of module: ☒ basic ☐ directional ☒ mandatory ☐ elective	Semester: V	☒ winter semester ☐ summer semester
Academic year:	2023/2024	Catalogue number:	**FVM-V-JMSS-05W-B56_21**

Module coordinator:	**Prof. dr hab. Anna Winnicka**
Teachers responsible for the module:	**Academic teachers of the Institute of Veterinary Medicine; Department of Pathology and Veterinary Diagnostics; PhD students in accordance to the internal legal acts; visiting professors; other specialists in the field of study**
Objectives of the module:	LECTURE TOPICS [60 hours]: • Homeostasis and its mechanisms of control. Disease – the definition and origin. Principles of nosology, categories of disease. Aging and death. • Cytopathology. Mechanisms of reversible and irreversible cell injury. Ischemia and hypoxia. Detrimental effects of free radicals. • Disturbances in water and mineral balance. Pathogenesis and adaptation to dehydration: isotonic, hypotonic and hypertonic. Over-hydration: hypotonic, hypertonic and isotonic. Basic mechanisms leading to formation of oedema. Pathogenesis of oedema in heart, liver and kidney disease. • Disturbances in acid-base balance. Pathogenesis and control of acid-base balance. Metabolic acidosis and alkalosis. • Inflammation (acute inflammation). Mediators of inflammation, pro- and anti-inflammatory cytokines and eicosanoids, functions and actions. • Inflammation (haematological signs of inflammation, chronic inflammation). Heterophagy and intracellular microorganism killing mechanisms. Regeneration and reparation. Wound healing. • Environmental factors leading to disease: changes in barometric pressure, changes in ambient temperature (extreme cold and heat), electrical injuries, exposure to sunlight, ionizing radiation. • Disturbances in endocrine regulations. Mechanisms of primary and secondary endocrine imbalances. Pathogenesis and clinical manifestations in endocrinopathies. • Metabolic diseases. Ketosis in ruminants. Parturient paresis in cattle. • Myopathies. • Nutrition. Deficiencies causing nutritional imbalances. Metabolic adaptation to starvation. Pathogenesis of diseases related to vitamin and mineral deficiencies. Part I and II. • Pathophysiology of digestive tract disorders. Ventricular disorders in monogastric and ruminant animals. Rumen acidosis and alkalosis. Bloat (ruminant tympany). Pathomechanism of diarrhea. Liver and pancreas diseases. • Pathophysiology of respiratory tract disorders. LABS / SEMINARS TOPICS [45 hours]: • Blood and haematopoiesis. Pathophysiology of anaemia. • Blood and haematopoiesis. Erythrocyte disorders. • Disorders of blood coagulation. • Leukocyte kinetics and disorders. Part I and II. • Pathophysiology of neoplasia. • Haematological signs of inflammation and other pathological conditions. • Seminar part I • Pathophysiology of the circulatory system. Circulatory failure. • Cardiac rhythm disorders, ECG. • Pathophysiology of diabetes mellitus. Pathophysiology of adrenal disorders. • Thermoregulation. Hypothermia and hyperthermia. Fever • Local circulatory disorders (hyperaemia, ischemia, thrombus, embolus, infarct). • Seminar part II • Phagocytosis and intracellular killing. The content of the lectures supplements the content of the laboratory classes.
Teaching forms, number of hours:	Lectures: hours 60 Laboratory classes: hours 39 Seminars: hours 6
Teaching methods:	• Original multimedia presentations prepared by academic teachers. • Short presentations prepared by the students, on the topics selected from the list given by the teacher, followed by discussion. • Methods aimed at teaching practical skills: • microscopic practice,

		• students group working on the topics given by the teacher (according to the materials prepared by the teacher), including discussion, concluding and the use of scientific sources, • individual and group working on the interpretation of basic diagnostic tests (from the materials given by the teacher) in the context of mechanisms that produced observed results. • Consultations (3h/week). Detailed schedule of the classes and detailed organization of consultations will be defined by the coordinator of the course at the beginning of semester.		
Formal prerequisites and initial requirements:		Passing the courses: Cell biology, Histology and embryology modules 1-2, Animal anatomy modules 1-2, Biochemistry modules 1-2, Biophysics, Animal physiology modules 1-2, Immunology		
Learning effects:		Course outcomes:	Learning outcomes relative to the course outcomes	Impact on the each course outcomes
Knowledge:	1	Student knows the mechanisms of homeostasis, its regulation and the changes during life cycle. Student understands the general criteria for differentiation between health and disease in individual animals, the herd and population. Student knows the general classification of the diseases and the types of the onset.	A.W.9; A.W.12; B.W.1 A.W.2; A.W.4; A.W.5; A.W.10 A.W.7	3 2 1
	2	Student knows the mechanisms and the effects of environmental factors on the organism of certain companion and farm animal species and the herd health.	A.W.11; A.W.12; B.W.1 A.W.2; A.W.4; A.W.10 A.W.7	3 2 1
	3	Student knows the mechanisms responsible for cellular function disorders, cellular regulatory mechanisms, the mechanisms of cellular pathologies and cellular death.	A.W.11; A.W.12; B.W.1 A.W.4; A.W.10	3 2
	4	Student knows the onset and role of inflammation in the pathologies of organs and systems.	A.W.11; A.W.12; B.W.1 A.W.4; A.W.10	3 2
	5	Student knows the causes, onset and the effects of systemic disorders that occur in the diseases of organs and systems.	A.W.11; A.W.12; B.W.1; B.W.2 A.W.2; A.W.4; A.W.5	3 2
	6	Student knows the mechanisms of organ diseases in certain companion and farm animal species.	A.W.11; A.W.12; B.W.1; B.W.2 A.W.2; A.W.4; A.W.5 B.W.3	3 2 1
	7	Student knows the relations among pathological processes in the organism.	A.W.11; A.W.12; B.W.1; B.W.2 A.W.2; A.W.4; A.W.5; A.W.10	3 2
	8	Student is familiar with the current nomenclature.	A.W.20	2
Skills:	1	Student is able to describe the general mechanisms responsible for health and diseases comprehensively enough for effective communication with other members of veterinary team and the animal's owner.	A.U.4; A.U.7; A.U.12; A.U.13; A.U.14; A.U.15; B.U.20 A.U.5 A.U.1	3 2 1
	2	Student is able to use the current nomenclature.	A.U.4; A.U.7; A.U.12; A.U.13; A.U.14; A.U.15; B.U.20	3
	3	Student is able to interpret symptoms of the diseases in the context of mechanisms that produced these symptoms.	A.U.4; A.U.12; A.U.21; A.U.23; B.U.20 A.U.5; A.U.19; B.U.6 A.U.1; B.U.7	3 2 1

	4	Student is able to indicate the relations among pathological processes.	A.U.4; A.U.12; A.U.21; A.U.23; B.U.20 A.U.5; A.U.19; B.U.6 A.U.1; B.U.7	3 2 1
	5	Student is able to indicate the differences among pathological processes typical for certain companion and farm animal species.	A.U.4; A.U.12; A.U.21; A.U.23; B.U.20 A.U.5; A.U.19; B.U.6 A.U.1; B.U.7	3 2 1
	6	Student is able to interpret the results of basic diagnostic tests in the context of organ and systemic pathologies.	A.U.4; A.U.12; A.U.21; A.U.23; B.U.20 A.U.5; A.U.19; B.U.6 A.U.1; B.U.7	3 2 1
	7	Student is able to evaluate CBC in inflammation.	B.U.6	2
	8	Student is able to use the scientific sources as a help in clinical issues.	A.U.21; A.U.23; B.U.20	3
Competences:	1	Student formulates the opinions taking into account cellular and organ pathologies as a basis for clinical presentation of the disease and the onset of therapeutic process.	KS.1; KS.2; KS.4; KS.5; KS.6; KS.7; KS.8; KS.9 KS.3	3 2
	2	Student is prepared to use the sufficient knowledge and skills for further application in the learning process.	KS.1; KS.2; KS.4; KS.5; KS.6; KS.7; KS.8; KS.9 KS.3	3 2
	3	Student is aware of having knowledge, understands the necessity of consultancy and is prepared to share the competencies with the veterinary team and the animal's owner.	KS.1; KS.2; KS.4; KS.5; KS.6; KS.7; KS.8; KS.9 KS.3	3 2
	4	Student is aware of the necessity of constant education using scientific sources.	KS.1; KS.2; KS.4; KS.5; KS.6; KS.7; KS.8; KS.9 KS.3	3 2
Objectives of the module required to obtain learning effects:		The discipline "Pathophysiology" introduces students to clinical medicine. The main goal is to provide students with information about causes (aetiology) and progress (pathogenesis) of disease. Students should accomplish the understanding of how disturbances in homeostasis lead to the onset and progression of disease. The dynamics of disorder depending on the severity of disease should allow the evaluation of possible outcomes and prognosis for recovery.		
Assessment methods:		Attendance to the classes is mandatory, student can be absent on 20% of labs or according to the current academic regulations. Passing the labs: Two tests – 30 questions each (multiple choice test, 0.5 point per correct answer). In each colloquium the Student can collect max. 15 points (min. 10 points to pass). If the minimum number of points is not obtained, it can be corrected on the second entry. Both terms have the same form. To pass the labs student must collect 20 points from both colloquiums (10 points from each, possible max. 30 points). Short presentation: (topic selected by the student from the given list) must be prepared by each student once during the course to pass the labs. The student can collect 0-10 points for the presentation. The grade is based on the presented content and discussion. This points are added to the final grade after passing the labs and the exam. Final exam: To enter the final exam, student must pass the labs. Final exam contains 100 questions (multiple choice test, 1 point per correct answer). To pass, student must collect 60 points. Retake is provided for students who failed or could not attend the first term. Both terms have the same form. In case of unforeseen, unusual circumstances mandatory remote teaching and remote assessment methods might be adopted. In case of unforeseen, unusual circumstances mandatory remote teaching and remote assessment methods might be adopted.		

Detail description of assessment methods; Formal documentation of learning outcomes:	No extra assessment methods are anticipated. eHMS entry. Records collected in the course portfolio (general rules of the course, students' presentations, database of questions, written colloquiums and final tests).
Elements impelling final grade:	Attendance to the classes is mandatory, student can be absent on 20% of labs or according to the current academic regulations. The final grade is based on the points from the final test and the points collected during the labs and the seminar. The following scale is used to grade the final grade: 0-80 failing grade (2), 81-92 passing grade (3), 93 – 104 passing plus grade (3.5), 105 – 116 good grade (4), 117 – 128 good plus grade (4.5), 129 – 140 excellent grade (5).
Teaching base:	Lecture facilities and laboratories of the Institute of Veterinary Medicine

Mandatory and supportive materials:

1. Robbins Basic Pathology, 10th Ed. Kumar V., Abbas A.K., Aster J. Elsevier, 2017
2. Pathologic basis of veterinary disease. M. D. McGavin and J. F. Zachary. Elsevier, 2016
3. Pathophysiology. I. Damjanov, Saunders, Elsevier, 2008
4. Fundamentals of Veterinary Clinical Pathology. S. L. Stockham, M. A. Scott. Blackwell Publ., 2008
5. Introduction to veterinary pathology. N. F. Cheville, Blackwell Publishing, 2006
6. Mechanisms of disease. A textbook of comparative general pathology. D. A. Slauson, B. J. Cooper. Mosby, 2001

Relevant scientific publications, including those of the module coordinator.

ANNOTATIONS

* 3 – complete and detailed, 2 – moderate, 1 – basic.

Quantitative summary of the module:

Estimated number of work hours per student (contact and self-study) essential to achieve presumed learning outcomes of the module - base for quantifying ECTS:	**240 h**
Total ECTS points, accumulated by students during contact learning:	**4 ECTS**