



SZKOŁA GŁÓWNA  
GOSPODARSTWA  
WIEJSKIEGO

## Pathophysiology

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Veterinary Medicine	<b>Didactic cycle</b> 2023/24	
<b>Speciality</b> -	<b>Subject code</b> WETFVMS_D.510.01699.23	
<b>Organizational unit</b> Faculty of Veterinary Medicine	<b>Lecture languages</b> english	
<b>Study level</b> long-cycle	<b>Mandatory</b> Obligatory subjects	
<b>Study form</b> full-time studies	<b>Block</b> Major subjects	
<b>Education profile</b> General academic	<b>Disciplines</b> Veterinary medicine	
<b>Coordinator</b>	Olga Witkowska-Piłaszewicz	
<b>Teacher</b>	Olga Witkowska-Piłaszewicz, Magdalena Żmigrodzka, Alicja Rzepecka	
<b>Period</b> Semester 5	<b>Examination</b> Exam	<b>Number of ECTS points</b> 8
	<b>Activities and hours</b> Lecture: 60 Laboratory exercises: 45	

#### Goals

Code	Goal
C1	Preparing students for clinical sciences, enlightening the definitions related to the science of disease, and the mechanisms leading to homeostasis disorders. Explanation of the dynamics of the processes determining the development of the disease, taking into account the connection of clinical and anatomopathological changes with the function of tissues, organs, and the whole organism during the disease.

## Entry requirements

Animal physiology 2, Biochemistry 2, Biophysics, Immunology, Cell biology, Histology and embryology 2, Microbiology 2, Parasitology and invasiology 1

## Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	- the mechanisms of homeostasis, - the regulation and the changes during life cycle, - the general criteria for differentiation between health and disease in individual animals, the herd and population. - the general classification of the diseases and the types of the onset.	A.W10, A.W12, A.W2, A.W4, A.W5, A.W7, A.W9	Presentation, Test (written or computer based)
W2	the mechanisms and the effects of environmental factors on the organism of certain companion and farm animal species and the herd health.	A.W10, A.W11, A.W12, A.W2, A.W4, A.W7	Presentation, Test (written or computer based)
W3	- the mechanisms responsible for cellular function disorders, cellular regulatory mechanisms, the mechanisms of cellular pathologies and cellular death. - the onset and role of inflammation in the pathologies of organs and systems. - the causes, onset and the effects of systemic disorders that occur in the diseases of organs and systems. - the mechanisms of organ diseases in certain companion and farm animal species. - the relations among pathological processes in the organism.	A.W10, A.W11, A.W12, A.W2, A.W20, A.W4, A.W5	Presentation, Test (written or computer based)
<b>Skills - Student can:</b>			
U1	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.U1, A.U13, A.U21, A.U23, A.U4, A.U5, A.U7, A.U8	Presentation, Test (written or computer based)
U2	use the current nomenclature,	A.U1, A.U13, A.U21, A.U23, A.U4, A.U5, A.U7, A.U8	Presentation, Test (written or computer based)
U3	interpret symptoms of the diseases in the context of mechanisms that produced these symptoms,	A.U1, A.U13, A.U21, A.U23, A.U4, A.U5, A.U7, A.U8	Presentation, Test (written or computer based)
U4	indicate the relations among pathological processes and the differences among pathological processes typical for certain companion and farm animal species,	A.U1, A.U13, A.U21, A.U23, A.U4, A.U5, A.U7, A.U8	Presentation, Test (written or computer based)
U5	interpret the results of basic diagnostic tests in the context of organ and systemic pathologies,	A.U1, A.U13, A.U21, A.U23, A.U4, A.U5, A.U7, A.U8	Presentation, Test (written or computer based)
U6	evaluate CBC in inflammation,	A.U1, A.U13, A.U21, A.U23, A.U4, A.U5, A.U7, A.U8	Presentation, Test (written or computer based)
U7	-use the scientific sources as a help in clinical issues.	A.U1, A.U13, A.U21, A.U23, A.U4, A.U5, A.U7, A.U8	Presentation, Test (written or computer based)
<b>Social competences - Student is ready to:</b>			

<b>Code</b>	<b>Outcomes in terms of</b>	<b>Effects</b>	<b>Examination methods</b>
K1	formulate 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.4, KS.5, KS.8, KS.9	Presentation
K2	prepare to use the sufficient knowledge and skills for further application in the learning process,	KS.1, KS.4, KS.5, KS.8, KS.9	Presentation
K3	understand the necessity of consultancy	KS.1, KS.4, KS.5, KS.8, KS.9	Presentation
K4	share the competencies with the veterinary team and the animal's owner,	KS.1, KS.4, KS.5, KS.8, KS.9	Presentation
K5	use scientific sources.	KS.1, KS.4, KS.5, KS.8, KS.9	Presentation

## **Study content**

No.	Course content	Subject's learning outcomes	Activities
1.	<ul style="list-style-type: none"> <li>· Homeostasis and its mechanisms of control. Disease – the definition and origin. Principles of nosology, categories of disease. Ageing and death.</li> <li>· Cytopathology. Mechanisms of reversible and irreversible cell injury. Ischemia and hypoxia. Detrimental effects of free radicals.</li> <li>· Inflammation (acute inflammation). Mediators of inflammation, pro- and anti-inflammatory cytokines and eicosanoids, functions and actions.</li> <li>· Inflammation (haematological signs of inflammation, chronic inflammation). Heterophagy and intracellular microorganism killing mechanisms. Regeneration and reparation. Wound healing.</li> <li>· 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 the formation of oedema. Pathogenesis of oedema in heart, liver and kidney disease.</li> <li>· Disturbances in acid-base balance. Pathogenesis and control of acid-base balance. Metabolic acidosis and alkalosis.</li> <li>· Environmental factors leading to disease: changes in barometric pressure, ambient temperature (extreme cold and heat), electrical injuries, exposure to sunlight, and ionizing radiation.</li> <li>· Circulatory insufficiency. Cardiomyopathies, valve insufficiency, acute and chronic left heart failure. Shock - types, phases, consequences and therapeutic interventions.</li> <li>· Disturbances in endocrine regulations. Mechanisms of primary and secondary endocrine imbalances. Pathogenesis and clinical manifestations in endocrinopathies.</li> <li>· Metabolic diseases. Ketosis in ruminants. Parturient paresis in cattle. Myopathies in horses.</li> <li>· Nutrition. Deficiencies causing nutritional imbalances. Metabolic adaptation to starvation. Pathogenesis of diseases related to vitamin and mineral deficiencies. Part I and II.</li> <li>· Pathophysiology of digestive tract disorders. Ventricular disorders in monogastric and ruminant animals. Rumen acidosis and alkalosis. Bloat (ruminant tympany). The pathomechanism of diarrhoea.</li> <li>· Pathophysiology of respiratory tract disorders.</li> </ul>	W1, W2, W3, U1, U2, U3, U4, U5, U6, U7, K1, K2, K3, K4, K5	Lecture
2.	<ul style="list-style-type: none"> <li>· Blood and haematopoiesis. Pathophysiology of anaemia.</li> <li>· Blood and haematopoiesis. Erythrocyte disorders.</li> <li>· Leukocyte kinetics and disorders. Part I and II.</li> <li>· Disorders of blood coagulation.</li> <li>· Haematological signs of inflammation and other pathological conditions.</li> <li>· Pathophysiology of diabetes mellitus.</li> <li>· Pathophysiology of adrenal disorders.</li> <li>· Phagocytosis and intracellular killing.</li> <li>· Thermoregulation. Fever. Acute phase response.</li> <li>· Pathophysiology of the circulatory system. Circulatory failure.</li> <li>· Local circulatory disorders (hyperaemia, ischemia, thrombus, embolus, infarct).</li> <li>· Cardiac rhythm disorders, ECG.</li> <li>· Pathophysiology of neoplasia.</li> </ul>	W1, W2, W3, U1, U2, U3, U4, U5, U6, U7, K1, K2, K3, K4, K5	Laboratory exercises

## Course advanced

Activities	Methods of conducting classes
Lecture	Lecture
Laboratory exercises	Case study, Presentation, Observation

Activities	Examination method	Percentage
Lecture	Test (written or computer based)	72%
Laboratory exercises	Test (written or computer based)	21%
Laboratory exercises	Presentation	7%

Activities	Credit conditions
Lecture	<ul style="list-style-type: none"> <li>• To enter the final exam, student must pass the labs.</li> <li>• 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.</li> <li>• The final grade is based on the points from the final test and the points collected during the labs and the seminar.</li> </ul> <p>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).</p> <ul style="list-style-type: none"> <li>• 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.</li> </ul>
Laboratory exercises	<ul style="list-style-type: none"> <li>• Attendance to the classes is mandatory, student can be absent on 20% of labs or according to the current academic regulations.</li> <li>• 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).</li> <li>• 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.</li> <li>• This points are added to the final grade after passing the labs and the exam.</li> </ul>

## Literature

### Obligatory

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

### Optional

1. Fundamentals of Veterinary Clinical Pathology. S. L. Stockham, M. A. Scott. Blackwell Publ., 2008
2. Introduction to veterinary pathology. N. F. Cheville, Blackwell Publishing, 2006
3. Mechanisms of disease. A textbook of comparative general pathology. D. A. Slauson, B. J. Cooper. Mosby, 2001
4. Relevant scientific publications, including those of the module coordinator.
5. Schalm's veterinary hematology. B.F.Feldman, J.G.Zinkl, N.C.Jain. Lippincott Williams&Wilkins, 2010

## Calculation of ECTS points

<b>Activity form</b>	<b>Activity hours*</b>
Lecture	60
Laboratory exercises	45
Preparation for the exam	70
Preparation for the test	60
Preparation of a multimedia presentation	5
<b>Student workload</b>	<b>Hours</b> 240
<b>Number of ECTS points</b>	<b>ECTS</b> 8

\* hour means 45 minutes

## Effects

Code	Content
KS.1	Absolwent jest gotów do wykazywania odpowiedzialności za podejmowane decyzje wobec ludzi, zwierząt i środowiska przyrodniczego
KS.4	Absolwent jest gotów do korzystania z obiektywnych źródeł informacji
KS.5	Absolwent jest gotów do formułowania wniosków z własnych pomiarów lub obserwacji
KS.8	Absolwent jest gotów do pogłębiania wiedzy i doskonalenia umiejętności
KS.9	Absolwent jest gotów do komunikowania się ze współpracownikami i dzielenia się wiedzą
A.U1	Absolwent potrafi wykorzystywać znajomość praw fizyki do wyjaśnienia wpływu czynników zewnętrznych (temperatury, ciśnienia, pola elektromagnetycznego, promieniowania jonizującego) na organizm zwierzęcy
A.U4	Absolwent potrafi opisać zmiany funkcjonowania organizmu w sytuacji zaburzeń homeostazy
A.U5	Absolwent potrafi przewidywać kierunek procesów biochemicznych w zależności od stanu energetycznego komórek
A.U7	Absolwent potrafi definiować stan fizjologiczny jako adaptację zwierzęcia do zmieniających się czynników środowiska
A.U8	Absolwent potrafi rozpoznawać w obrazach z mikroskopu optycznego struktury histologiczne odpowiadające narządom, tkankom i komórkom, dokonywać ich opisu, interpretować ich budowę oraz relacje między ich budową a czynnością, uwzględniając gatunek zwierzęcia, z którego pochodzą
A.U13	Absolwent potrafi słuchać i udzielać odpowiedzi językiem zrozumiałym, odpowiednim do sytuacji
A.U21	Absolwent potrafi zrozumieć potrzebę kształcenia ustawicznego w celu ciągłego rozwoju zawodowego
A.U23	Absolwent potrafi korzystać z rady i pomocy wyspecjalizowanych jednostek organizacyjnych lub osób w rozwiązywaniu problemów
A.W2	Absolwent zna i rozumie budowę, czynność i mechanizmy regulacji narządów i układów organizmu zwierzęcego (oddechowego, pokarmowego, krążenia, wydalniczego, nerwowego, rozrodczego, hormonalnego, immunologicznego i powłok skórnych oraz ich integracji na poziomie organizmu
A.W4	Absolwent zna i rozumie procesy metaboliczne na poziomie molekularnym, komórkowym, narządowym i ustrojowym
A.W5	Absolwent zna i rozumie zasady działania gospodarki wodno-elektrolitowej, równowagi kwasowo-zasadowej organizmu zwierzęcego oraz mechanizm działania homeostazy ustrojowej
A.W7	Absolwent zna i rozumie prawa fizyczne opisujące przepływ cieczy oraz czynniki wpływające na opór naczyniowy przepływu krwi
A.W9	Absolwent zna i rozumie mechanizm regulacji neurohormonalnej, reprodukcji, starzenia się i śmierci
A.W10	Absolwent zna i rozumie zasady i mechanizmy leżące u podstaw zdrowia zwierząt, powstawania chorób i ich terapii - od poziomu komórki, przez narząd, zwierzę, stado zwierząt do całej populacji zwierząt
A.W11	Absolwent zna i rozumie związek pomiędzy czynnikami zaburzającymi stan równowagi procesów biologicznych organizmu zwierzęcego a zmianami fizjologicznymi i patofizjologicznymi
A.W12	Absolwent zna i rozumie zmiany patofizjologiczne komórek, tkanek, narządów i układów zwierząt oraz mechanizmy biologiczne, w tym immunologiczne, a także możliwości terapeutyczne umożliwiające powrót do zdrowia
A.W20	Absolwent zna i rozumie polską i łacińską nomenklaturę medyczną