

Module title:	Animal physiology (2)	ECTS	6
Polish translation:	Fizjologia zwierząt (2)		
Course:	Veterinary Medicine		

Module language: English		Stage: JM-FVM	
Form of studies: <input checked="" type="checkbox"/> intramural <input type="checkbox"/> extramural	Type of module: <input checked="" type="checkbox"/> basic <input type="checkbox"/> directional	<input checked="" type="checkbox"/> mandatory <input type="checkbox"/> elective	Semester: 4 <input type="checkbox"/> winter semester <input checked="" type="checkbox"/> summer semester
Academic year: 2022/2023		Catalogue number:	FVM-V-JMSS-04S-B39_21

Module coordinator:	<b>Dr hab. Tomasz Sadkowski, prof. SGGW</b>
Teachers responsible for the module:	<b>Academic teachers of the Institute of Veterinary Medicine; Department of Physiological Sciences; PhD students in accordance to the internal legal acts; visiting professors; other specialists in the field of study</b>
Objectives of the module:	<p>During the animal physiology course in the summer semester, a student of the Faculty of Veterinary Medicine acquires basic and advanced knowledge of the physiological issues presented below. The acquired knowledge will allow to understand the functioning of individual organs / systems as well as the body as a whole. It will also be the basis for further education of students allowing identification of disorders in the proper physiological functioning of the body and its tissues / organs (among others: pathophysiology, internal diseases, etc.).</p> <p><u>Lecture topics:</u></p> <p>Physiology of gastrointestinal tract- among others: regulation of appetite and thirst, regulation of salivation, regulation of gastric secretion, regulation of secretion of pancreatic juice; regulation of bile secretion and its functions, secretion of intestinal juice, digestion and absorption of digestion products: sugars, proteins, fats (4 hours); The specificity of digestion in ruminants - among others: digestion in young ruminants, fermentation processes in the forestomachs, fate of protein and fat, ionophores, protein substitutes, protein and fat resistant to degradation in the forestomachs (2 hours); Overall and basic metabolism and energy - among others: energy balance, test methods, factors affecting basic metabolism and energy, regulation (2 hours); Thermoregulation - among others: routes of heat loss, examination methods, fever, hibernation, body temperature regulation (2 hours); Water and electrolyte management - among others: water balance, water compartments and methods of their examination, the role of the kidney in the regulation of water and electrolyte management (2 hours); Physiology of the kidney - among others: kidney functions, primary urine formation, urine concentration mechanism, kidney function tests (4 hours); Physiology of the female reproductive system - among others: oestrus cycle - species differences, ovarian cycle, regulation of ovarian function, ovarian hormone functions (2 hours); Physiology of the male reproductive system - among others: spermiogenesis, regulation of testicular function, functions of accessory sex glands, effects of hormones: androgens and estrogens (2 hours); Regulation of pregnancy and parturition - include: hormonal regulation of pregnancy, regulation of delivery, reproductive biotechnology (2 hours); Physiology of lactation - among others: mammogenesis, lactogenesis, galactopoiesis, milk ejection mechanism, lactation curve (2 hours); Physiology of the mechanism of remodeling the mammary gland - among others: growth and involution, local apoptogenic factors, species specificity (2 hours); Nutrients and bioactive ingredients of milk - among others: nutrients, bioactive ingredients, the importance of bioactive ingredients in various mammalian species, bioactive ingredients in newborn health (2 hours); Physiology of adipose tissue (2 hours).</p> <p><u>Laboratory classes topics:</u></p> <p>Electrical and mechanical properties of smooth muscles; gastrointestinal tract motility (6 hours); Digestive functions of the liver and pancreas (3 hours); Respiratory system mechanics. Lung properties on a macro scale (6 hours); Platelets and haemostasis (3 hours); Thermogenesis and routes of heat dissipation from the body; determination of indirect calorimetry (3 hours); Kidney function tests (3 hours); Influence of sex hormones on sexual cycle and function of gonads (3 hours); Changes in female organism during pregnancy (3 hours); Endocrine physiology (3 hours); Gastrointestinal hormones (3 hours seminar); Acid-base balance (exercises 3 hours; seminar 3 hours); Avian physiology (3 hours seminar).</p> <p>The content of lecture education supplements the content of the exercise education.</p>

	The topics of lectures and exercises, as well as their form and number of hours may change depending on the current external conditions determined by the published legal acts.			
Teaching forms, number of hours:	a) Lectures; hours 30; b) Laboratory classes; hours 36; c) Seminars; hours 9;			
Teaching methods:	<p><b>Lectures:</b> multimedia presentations by IMW employees responsible for conducting lectures discussing selected issues of animal physiology (see above - description of lectures) with reference to practical and clinical aspects.</p> <p><b>Laboratory exercises:</b> introduction to the exercises - original multimedia presentations prepared by the lecturers; analysis of selected issues in animal physiology (see above - classes description) by students using computer simulations (e.g. PhysioEx and Virtual Physiology), practical exercises based on the PowerLab system and other dedicated to physiology classes. Students perform the practical part of the exercise individually or in 2-3-person subgroups, then the exercises are discussed with the teacher.</p> <p><b>Seminars:</b> students individually or in groups of 2 work out issues in animal physiology agreed with the group teacher and present them in the form of a public presentation. Then the presentation is discussed in the group forum, moderated by the teacher.</p> <p><b>Consultations for students</b> - 1h / week. Detailed organization of consultations will be defined by the coordinator of the course at the beginning of semester.</p> <p>Detailed schedule will be defined by the coordinator of the course at the beginning of semester.</p>			
Formal prerequisites and initial requirements:	Required credits for the subjects: histology and embryology, chemistry, animal anatomy, biophysics, biochemistry (1), animal physiology (1)			
Learning effects	Course outcomes:	Learning outcomes relative to the course outcomes	Impact on the course outcomes*	
Knowledge:	1	1 - knows the functioning of individual cell structures / systems / organs such as smooth muscle, digestive system, liver, pancreas, respiratory system, kidney, female and male reproductive system, mammary gland, adipose tissue.	A.W.1 A.W.2, A.W.8 A.W.4, A.W.9, A.W.10	1 3 2
	2	2 - knows the species differences in the functioning of organs / systems and their physiological parameters (digestive system - specificity of digestion in ruminants, thermoregulation, kidney, reproductive system, pregnancy and lactation, physiology of birds).	A.W.2	3
	3	3 - knows the functional connections between the organs / tissues.	A.W.2, A.W.4	2
	4	4 - knows the methods of testing parameters determining the physiological state of the body such as: water and electrolyte balance, peripheral blood morphological analysis, methods of testing kidney function, indirect transformation.	B.W.4, B.W.6	1
	5	5 - knows the mechanisms integrating the functioning of the whole body and maintaining homeostasis of the body (thermoregulation, water and electrolyte balance, acid-base balance, metabolism and energy).	A.W.4, A.W.9 A.W.5 A.W.11	2 3 1
	6	6 - knows the disturbances in the functioning of the organs as examples of malfunctioning of the body.	A.W.11	1
	7	7 - knows the concepts of intellectual property protection.	A.W.23	1
Skills:	1	1 - can explain the physiological mechanisms / molecular mechanisms of cellular structures / organs / systems such as: the nervous system, CNS, AUN, skeletal muscles, heart muscle, cardiovascular system, sense organs, respiratory system.	A.U.8	1
	2	2 - can explain the physiological fundamentals / mechanisms of sensation and perception, movement and maintenance of body posture, physiological fundamentals of behavior, endocrinology (hypothalamic-pituitary axis, peripheral endocrine glands and tissue hormones), regulation of blood flow in vessels, gas exchange.	A.U.8 A.U.7	1 2
	3	3 - can indicate how the discussed tissues / organs / systems can affect each other and what are the consequences for the functioning of the body.	A.U.8	1
	4	4 - can indicate the parameters describing the physiological state of the organs / systems in question - can define the physiological (health) state of the body.	A.U.1, B.U.12 A.U.4, A.U.7	1 2
	5	5 - can plan and carry out a simple experiment allowing the analysis of physiological parameters.	A.U.13, A.U.14,	1

			A.U.15, A.U.23	
	6	6 - can perform a morphological analysis of peripheral blood by a traditional method, spirometry by various methods and examine blood saturation.	A.U.2, B.U.6	1
	7	7 - can analyse information from publicly available databases, including scientific ones.	C.U.2, C.U.3	1
Competences:	1	1 - is ready to evaluate and interpret the functioning of the body / systems / organs / cells in the context of smooth muscle activity, digestive system, liver, pancreas, respiratory system, blood, kidney, reproductive system of the female and male, mammary gland, adipose tissue, their mutual impact and ensure the homeostasis of the body.	KS.1, KS.4, KS.5, KS.6, KS.7	2
	2	2 - can indicate interspecies differences in the functioning of organs / systems and explain the molecular / physiological basis of these differences (digestive system - specificity of digestion in ruminants, thermoregulation, kidney, reproductive system, pregnancy and lactation, physiology of birds).	KS.1, KS4	2
	3	3 - is ready to perform basic physiological (scientific) experiments and to draw correct conclusions from the observations made.	KS.5	2
	4	4 - is critical of his knowledge and constantly updates it in accordance with the latest state of general knowledge, uses scientific sources to expand his knowledge.	KS.4, KS.8, KS.7, KS.9	2
	5	5 - is ready to cooperate - consult other people and share the knowledge with others.	KS.3, KS.4, KS.7, KS.9	1
	6	6 - is ready to apply his knowledge and skills in further stages of education.	KS.1, KS.4, KS.5, KS.6, KS.7, KS.8, KS.9,	2
Objectives of the module required to obtain learning effects:	Knowledge of the lecture, class and seminar topics indicated in the objectives of the module, as well as knowledge available in the compulsory and supplementary literature (topics corresponding to those of the objectives of the module). Passing both tests, giving a presentation during the seminar and passing of the final exam.			
Assessment methods:	Laboratory class credit, Tests, Seminar, Final Exam  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 outcome:	<p><b>Laboratory class credit:</b> The student is required to perform the exercises in accordance with the instructions of the teacher conducting the class, to complete the review sheet with data obtained during experiments and the answers to the indicated questions. At the end of the class, the teacher checks review sheets, asks verification questions, corrects incorrect answers by explaining the physiological mechanisms they concern. The condition of passing the classes is the teacher's approval of the individual review sheet prepared by the student during each laboratory class.</p> <p><b>Tests:</b> Students are required to complete two tests per semester (each contains 8 open questions, a maximum of 5 points per question; 24 points necessary to pass the test). The retake of the test is in the same form. At all tests, all material from the schedule of lectures, laboratory and seminar preceding the test as well as relevant material from mandatory and supportive literature applies.</p> <p><b>Seminar:</b> Each student is required to prepare and deliver a seminar. Seminar topics are proposed by the teachers, selected by students from the proposed pool according to their interests. It is allowed for the student to prepare his / her own seminar topic after having been approved by the teacher. Positive evaluation of the seminar is one of the conditions for passing the semester (seminar is mandatory). The seminar is scored on a scale of 0-10 points (compliance with the topic, explanation of physiological foundations of the issues discussed, manner of presentation, formulation of opinions, conducting discussions, appropriate answers to questions, justification / defence of opinions).</p> <p><b>Completion of the semester:</b> During the semester, the student may receive a maximum of 90 points: from two tests (each max. 40 points; a minimum of 24 points from each test is required) and a seminar (max. 10 points) + additional points for activity (discussion, answers to questions, completion of tasks) - max. 9 points. Student must get a minimum of 60% of points to pass the semester (excluding points for activity).</p> <p>Criterion for issuing the semester grade:</p> <p>54 - 59 punkty – satisfactory (3,0) 60 – 64 punkty – satisfactory plus (3,5) 64 – 69 punkty – good (4,0)</p>			

	<p>70 – 84 punkty – good plus (4,5) 84 – 90 punkty – very good (5,0)</p> <p><b>Final exam:</b> Only students who passed both semesters of animal physiology classes are allowed to take the final exam. The final exam verifies all the learning content obtained during both semesters (lectures, laboratory and seminar exercises as well as the corresponding material available in basic and supplementary literature).</p> <p>The final exam is a test (100 different test questions - single choice test, true / false, questions to be completed, etc.). Each question is scored on a 0-1 point scale. 60 points (60%) are required to pass the final test.</p> <p>Criterion for issuing the final exam grade:</p> <p>60-68% punktów – satisfactory (3,0) 69-76% punktów – satisfactory plus (3,5) 77-84% punktów – good (4,0) 85-92% punktów – good plus (4,5) 93-100% punktów – very good (5,0)</p> <p>No extra assessment methods are anticipated.</p> <p>In case of mandatory suspension of classes at the University (on the current legal regulations) and the need for distance / hybrid teaching, other forms of verification of learning outcomes are allowed in a manner appropriate to the situation. Regardless of the above, the assumed practical learning outcomes assigned to subject/classes will be verified only during contact classes/examination</p> <p>eHMS entry. Records collected in the course portfolio i.e. individual records of student results, presence lists, database of oral and written questions, written assessments of the students, book with grades</p>
Elements impelling final grade:	<p><b>Final grade:</b> To obtain a positive final grade (final credit) in the subject Animal Physiology it is necessary to pass two semesters and a final exam.</p> <p>The method of calculating the final grade from the subject Animal Physiology: <math>FC = SS * 0.25 + FE * 0.75</math> where FC - final credit SS - grade from the summer semester FE - final exam</p> <p>If the final exam is not passed on both dates, the final grade in the subject is an unsatisfactory grade, regardless of individual partial grades.</p>
Teaching base:	IMW lecture halls, laboratory rooms of the Department of Physiological Sciences No. 233, 235 and 236 (building 24)
Mandatory and supportive literature:	<ol style="list-style-type: none"> <li>1. JG. Cunningham BG Klein, Textbook of Veterinary Physiology, Saunders Elsevier, 2012</li> <li>2. T. Stabler et al. PEARSON B. CUMMINGS PhysioEx™ 6.0 for Human Physiology – Laboratory Stimulation in Physiology</li> <li>3. WF. Boron, EL. Boulpaep, Medical Physiology. A Cellular and Molecular Approach, Saunders Elsevier, 2009</li> <li>4. CD. Moyes, PM. Schulte, Principles of Animal Physiology, Pearson Education, 2007</li> </ol>
Relevant scientific publications, including those indicated by the module coordinator or lecturer.	
ANNOTATIONS	
Lab coat is mandatory during laboratory classes	

\* 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:	<b>150 h</b>
Total ECTS points, accumulated by students during contact learning:	<b>6 ECTS</b>