

UNIVERSITY OF ZAGREB  
FACULTY OF VETERINARY MEDICINE  
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Ur.br.:

Zagreb, June 24<sup>th</sup> 2018

## COURSE SYLLABUS

**Course name: Physiology of domestic animals I**

Academic year 2018/19

**Head teacher:** Miljenko Šimpraga, DVM, PhD, full professor

Teachers: Miljenko Šimpraga, DVM, PhD, full professor; Suzana Milinković Tur, DVM, PhD, full professor;  
Jasna Aladrović, DVM, PhD, associate professor, Ana Shek Vugrovečki, DVM, PhD, assistant professor, Ivona Žura Žaja DVM,  
PhD, assistant professor

Associate teachers:, PhD; Lana Vranković DVM, PhD; Jadranka Pejaković Hlede, DVM

Begin at: October 1st 2018

End at: January 16<sup>th</sup> 2019

**Timetable for LECTURES academic year 2018./2019.**

<b>LECTURES</b>				
<b>Date</b>	<b>Methodological unit</b>	<b>Teacher</b>	<b>Location / time</b>	<b>Literature</b>
1.10.2018	Introduction to physiology of living creatures, importance in veterinary medicine  <b>Body fluids</b> Body fluids dynamics, osmotic pressure, intracellular and extra cellular fluid.	Ana Shek Vugrovečki , DVM, PhD, assistant professor Ivona Žura Žaja, DVM, PhD, assistant professor	Department of Physiology and Radiobiology  14–16h	(see the list of the required literature)
2.10.2018	<b>Cell Physiology</b> Function of the cells structures, membrane receptors, cells signalisation	Ivona Žura Žaja, DVM, PhD, assistant professor	Department of Physiology and Radiobiology 12-14h	(see the list of the required literature)
9.10.2018	<b>Homeostasis, acid-base balance</b> Internal environment – confined system, ways of keeping homeostasis, mechanisms for acid-base balance keeping	Ivona Žura Žaja, DVM, PhD, assistant professor	Department of Physiology and Radiobiology, 10-12h	(see the list of the required literature)
11.10.2018	<b>Blood Physiology</b> Blood functions, composition and role, plasma corpuscular elements.	Ana Shek Vugrovečki , DVM, PhD, assistant professor	Department of Physiology and Radiobiology  11-13h	(see the list of the required literature)
17.10.2018	<b>Blood Physiology</b> Erythrocytes, leukocytes.	Ana Shek Vugrovečki , DVM, PhD, assistant professor	Department of Physiology and Radiobiology 12 -14h	(see the list of the required literature)
5.11.2018	<b>Blood Physiology</b>	Ana Shek Vugrovečki ,	Department of Physiology and	(see the list of the required

	Platelets, blood coagulation	DVM, PhD, assistant professor	Radiobiology 10-12h	literature)
13.11.2018	<b>Nervous Physiology</b> Nervous system organisation, reflex	Ivona Žura Žaja, DVM, PhD, assistant professor	Department of Physiology and Radiobiology 15-17h	(see the list of the required literature)
23.11.2018	<b>Nervous Physiology</b> Structure of the nervous system, nervous activity mechanism	Ivona Žura Žaja, DVM, PhD, assistant professor	Department of Physiology and Radiobiology 12-14h	(see the list of the required literature)
26.11.2018	<b>Nervous Physiology</b> Brain function  <b>Muscle Physiology</b> Skeletal muscles	Ivona Žura Žaja, DVM, PhD, assistant professor  Jasna Aladrović, DVM, PhD, associate professor	Department of Physiology and Radiobiology 12-14h	(see the list of the required literature)
30.11.2018	<b>Muscle Physiology</b> Smooth muscles, muscle action	Jasna Aladrović, DVM, PhD, associate professor	Department of Physiology and Radiobiology, lecture room 10 – 12h	(see the list of the required literature)
07.12.2018	<b>Endocrinology</b> Neuroendocrine system, autonomic nervous system-endocrine glands binding. Cortex-limbic system-hypothalamus-hypophysis.	Jasna Aladrović, DVM, PhD, associate professor	Department of Physiology and Radiobiology 14-16h	(see the list of the required literature)
11.12.2018	<b>Endocrinology</b> Hormones interaction, the general chemism and the way of function	Jasna Aladrović, DVM, PhD, associate professor	Department of Physiology and Radiobiology 10-12h	(see the list of the required literature)
17.12.2018	<b>Endocrinology</b> Thyroid hormones and pancreatic hormones	Jasna Aladrović, DVM, PhD, associate professor	Department of Physiology and Radiobiology 9-11h	(see the list of the required literature)



	unit		(čl. 34 Pravilnika o integriranom studiju)			
3.10.2018.	<b>Basic physiology</b> Transport across cell membranes	Lana Vranković DVM, PhD and other teachers	Construction exercise – computer simulations		computer hall, Department of Pathophysiology  10 - 13h	Stabler, T., L. Smith, G. Peterson, A. Lokuta (2008): PhysioEx™ 7.0 for Human Physiology, Laboratory simulations in physiology. Pearson Benjamin Cummings. San Francisco.
12.10.2018.	<b>Body fluids</b> Isotonic, hypotonic and hypertonic fluids, osmotic pressure. Determination of erythrocytes' osmotic pressure resistance. Venepuncture, anticoagulants, blood plasma, serum, blood coagulation.	Lana Vranković DVM, PhD and other teachers	Laboratory exercise		practical hall, Department of Physiology and radiobiology  9-12h	Powerpoint presentations handouts
18.10.2018	<b>Blood physiology</b> Erythrocytes' count Reticulocytes	Lana Vranković DVM, PhD and other teachers	Laboratory exercise		practical hall, Department of Physiology and radiobiology 10-13h	Powerpoint presentations handouts
22.10.2018	<b>Blood physiology</b>	Jadranka Pejaković	Laboratory exercise		practical hall, Department of	Powerpoint presentations handouts

	Haemoglobin, Haematocrit, erythrocytes' constants Teichman's crystals	Hlede DVM, PhD and other teachers			Physiology and radiobiology  15 -18h	
30.10.2018	<b>Blood physiology</b> Total leucocyte count Conversatorium about haematopoiesis and lymph physiology	Lana Vranković DVM, PhD and other teachers	Laboratory exercise		practical hall, Department of Physiology and radiobiology  13 - 16h	Powerpoint presentations handouts
8.11.2018	<b>Blood physiology</b> Blood slide preparing and staining, Sedimentation rate determination	Ivona Žura Žaja, DVM, PhD, assistant professor and other teachers	Laboratory exercise		practical hall, Department of Physiology and radiobiology  8 - 11h	Powerpoint presentations handouts
15.11.2018	<b>Blood physiology</b> Differential blood count, automatic blood analyser	Ana Shek Vugrovečki, Ph D, DVM, assistant professor and other teachers	Laboratory exercise		practical hall, Department of Physiology and radiobiology  8 - 11h	Powerpoint presentations handouts
21.11.2018	<b>Blood physiology</b>	Ivona Žura Žaja, DVM,	Laboratory exercise		practical hall, Department of	Powerpoint presentations handouts

	Blood groups determination in dogs and cats	PhD, assistant professor and other teachers			Physiology and radiobiology 13 - 16h	
28.11.2018	<b>Nervous system</b> excitability, conductivity, polarisation, membrane potential in rest, threshold, action potential, refractory phase, stimulation and inhibition of action potential, relationship between nerve myelinisation and thickens and speed of signal conductivity	Jadranka Pejaković Hlede DVM, PhD and other teachers	Construction exercise – computer simulations		computer hall, Department of Pathophysiology 13 - 16h	Stabler, T., L. Smith, G. Peterson, A. Lokuta (2008): PhysioEx™ 7.0 for Human Physiology, Laboratory simulations in physiology. Pearson Benjamin Cummings. San Francisco.
05.12.2018	<b>Muscular system</b> motor units summation, maximal stimulus, tetanus, isometric and isotonic	Jadranka Pejaković Hlede DVM, PhD and other teachers	Construction exercise – computer simulations		computer hall Department of Animal Husbandry 14 - 17h	Stabler, T., L. Smith, G. Peterson, A. Lokuta (2008): PhysioEx™ 7.0 for Human Physiology, Laboratory simulations in physiology. Pearson Benjamin Cummings. San Francisco.

	contraction					
10.12.2018	<b>Special senses</b> hearing, smell, sight and taste	Ana Shek Vugrovečki, Ph D, DVM, assistant professor and other teachers	Exercise in practicum		practical hall, Department of Physiology and radiobiology  13 -16h	Powerpoint presentations handouts
14.12.2018	<b>EEG</b> Diagnostic method simulation, electromagnetic waves	Jadranka Pejaković Hlede DVM, PhD and other teachers	Exercise in practicum		practical hall, Department of Physiology and radiobiology  14 - 17h	Pflanzer, R., J.C. Uyehara, E. McMullen (2000). Physiology lessons for use with BIOPAC student lab. Biopac Systems®, Inc. Goleta, California
09.1.2019	<b>Endocrinology</b> Positive and negative feedback, thyroxine function, TSH in animal metabolism	Lana Vranković DVM, PhD and other teachers	Construction exercise – computer simulations		computer hall, Department of Animal husbandry  13 - 16h	Stabler, T., L. Smith, G. Peterson, A. Lokuta (2008): PhysioEx™ 7.0 for Human Physiology, Laboratory simulations in physiology. Pearson Benjamin Cummings. San Francisco.
16.01.2019	<b>Endocrinology</b> Mechanism of hormonal replacement therapy (oestrogen) action, insulin action	Jasna Aladrović, PhD, DVM, associate teacher	Construction exercise – computer simulations		computer hall, Department of Pathophysiology  11 – 13h	Stabler, T., L. Smith, G. Peterson, A. Lokuta (2008): PhysioEx™ 7.0 for Human Physiology, Laboratory simulations in physiology. Pearson Benjamin Cummings. San Francisco.

**About possible course syllabus' amendments the students will be informed in time.**

**STUDENT RESPONSABILITIES**

Attendance at lectures	During semester a student must attend 15 lecture lessons in order to gain minimal 3 points. The maximum number of points from this evaluation element is 6.
Attendance at seminars	
Attendance at exercises	During semester a student must attend 36 exercise lessons in order to gain minimal 8 points. The maximum number of points from this evaluation element is 12. When the student upon the completion of teaching in the first try makes up for nonattendance of an exercise (excused and approved), points are added to the gained ones. If the student makes up for the unattended lessons in further tries the points do not count.
Active participation in seminars and exercises	During the practical part of the lesson (exercises), which is 50 hours of teaching, the student must successfully complete scheduled tasks and receive teacher's signature for the completed assignments. Each neatly done and signed task is worth 0.3 points. During the exercise the student can achieve a total of 4.2 (4) points. During the course, the student's activity is evaluated during the exercises. For six positive answers, the student earns an additional 6 points. During the practical part of the course, the student must achieve a minimum of 5 points and can achieve the maximum of 10 points
Final exam	The final exam starts with a student's short analysis of results gained from the first four evaluation elements. At the final exam the student answers the questions in oral form. The final exam comprises the material from endocrinology and it estimates the capability of a student to connect physiological processes. The maximum gained number of points at the final exam is 40 points. Regardless the gained number of points from the first four evaluation elements, the student must show minimal knowledge at the final exam in order to earn minimal 24 points. In case the student does not satisfy at the final part of the exam, the lecturer determines time for re-examination.
Conditions for obtaining signatures	Student obligations are defined with the Regulations on the integrated undergraduate and graduate study of veterinary medicine. Given the above, the student must acquire a minimum number of points from all elements of assessment in order to pass the course. <b>Article 45:</b> student can reasonably be

	absent from teaching activities, as follows: up to 50 % of the lectures; up to 30% of the seminars and 30 % of the exercises.
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### GRADING AND EVALUATING STUDENT WORK

Continuous knowledge checking (colloquia)	<p>During the course of the Physiology of Domestic Animals I two assessment of knowledge (colloquia) will be organized. The first colloquium includes basic physiology and physiology of the blood, and the second examination involves the physiology of the muscular and nervous system. At each colloquium, the student must achieve at least 10 points to achieve the required 20 points. The maximum number of points scored from this grading element is 32 points.</p> <p>A student who does not achieve the necessary points during the course of instruction is entitled to three times access to a correctional colloquium that will be organized in certain terms.</p> <p><b>The terms of the colloquium from the Physiology of Domestic Animals I in the academic year 2018/2019.</b></p> <p><b>Basic physiology and physiology of blood December 4th, 2018 10 - 11h</b>  <b>Nervous and muscle system physiology January 14th, 2019 13 - 14h</b></p> <p><b>The terms of repeated colloquium from the Physiology of Domestic Animals I during the winter semester and the winter exam period of the academic year 2017/2018 will be held according to the following schedule:</b></p> <p><b>January 18th, 2019 10 - 11h</b>  <b>January 31st, 2019 10 - 11h</b>  <b>February 13th, 2019 10 - 11h</b></p>
Final exams (dates)	<b>February 8<sup>th</sup> 2018, February 16<sup>th</sup> 2018</b>
Form of final exam	oral exam

### LITERATURE

Obligatory literature	1. Cunningham, J. G.: Textbook of veterinary physiology. 3rd edition, W. B. Saunders Company,
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	<p>2002.</p> <ol style="list-style-type: none"> <li>Dukes' physiology of domestic animals (William O. Reece, Ed.). The 12th ed. Cornell University Press. Ithaca and London, 2004.</li> <li>Sjaastad Ø. V., O. Sand, K. Hove: Physiology of Domestic Animals. The 12nd ed. Scandinavian veterinary press, 2010.</li> <li>Vander, A. J., J. H. Sherman, D. S. Luciano: Human physiology. The mechanisms of body function. The 5th ed. McGraw-Hill Publishing Comp. New York, 1990.</li> </ol>
Supplementary literature	<ol style="list-style-type: none"> <li>Feldman, B. F., J. G. Zinkl, N. C. Jain: Schalm's Veterinary Hematology. 5th ed. Lippincott Williams &amp; Wilkins, 2000.</li> <li>Kaneko, J. J., J. W. Harvey, M. L. Bruss: Clinical Biochemistry of Domestic Animals. Academic Press. San Diego, Boston, New York, Sydney, Tokyo, 1987.</li> <li>Payne, J. M., S. Payne: The Metabolic Profile Test. Oxford University Press. Oxford, New York, Tokyo, 1987.</li> <li>Schmidt-Nielsen, K.: Animal Physiology. Adaptation and Environment. Cambridge University Press, 1997.</li> </ol>

### **OBJECTIVES AND LEARNING OUTCOMES**

Course objectives	<p>Course of Physiology of domestic animals I qualifies students for progressive development of knowledge from physics, chemistry, biochemistry, histology and anatomy and understanding of basic principles and facts of physiological processes from cell to the total body, understanding and correlating of regulatory mechanisms, understanding of homeostasis keeping, acid-base balance, development of knowledge and skills related to body liquids in special regard of blood physiology, understanding of physiological function of muscle/nervous system, physiological function of hormones in context of the whole homeostatic system. The goal is to provide the progressive development of skills in collecting, preparing, and interpreting the results of the different sample analysis, to provide modern trends in veterinary physiology so that students will achieve a working knowledge of physiology; development of abilities for interpretation, and conclusion about information; the abilities of searching for information in the literature.</p>
Learning outcomes	<p>After successfully mastering the course students will be able to:</p> <ul style="list-style-type: none"> <li>- describe the basic principles and the facts of the physiological processes from the cell to the whole organism,</li> </ul>

- explain the physiological functions of the blood, nervous and muscular system and hormones,
- recognize the importance of maintaining continuous function of blood, nerve and muscle tissue,
- connect the regulatory mechanisms maintain homeostasis and acid-base balance;
- use the skills of obtaining and analyzing whole blood, plasma, and serum
- to evaluate whether the obtained values are within physiological limits for certain species of domestic animals, and
- to conclude how blood tests can indicate certain pathological changes or certain disease stages

#### **GRADING OF STUDENT WORK**

<i>Points</i>	<i>Grade</i>
Up to 59	1 (F)
60-68	2 (E)
69-76	2 (D)
77-84	3 (C)
85-92	4 (B)
93-100	5 (A)

Head teacher:

Head of Department/Clinic:

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 Note: The head teacher is required to submit a Course Syllabus to all teachers and associates on the Course.

**GRADING AND EVALUATION OF STUDENT WORK ON COURSES WITH LECTURES,  
SEMINARS and EXERCISES**

<b>Type of activity</b>	<b>Minimal number of points</b>	<b>Maximal number of points</b>
Attendance at lectures	<b>3</b>	<b>6</b>
Attendance at seminars	<b>4</b>	<b>6</b>
Attendance at exercises	<b>4</b>	<b>6</b>
Active participation in seminars and exercises	<b>5</b>	<b>10</b>
Continuous knowledge checking (colloquia)	<b>20</b>	<b>32</b>
Final exam	<b>24</b>	<b>40</b>
<b>TOTAL</b>	<b>60</b>	<b>100</b>

**GRADING AND EVALUATION OF STUDENT WORK ON COURSES WITH LECTURES and  
SEMINARS**

<b>Type of activity</b>	<b>Minimal number of points</b>	<b>Maximal number of points</b>
Attendance at lectures	<b>3</b>	<b>6</b>
Attendance at exercises	<b>8</b>	<b>12</b>
Active participation in exercises	<b>5</b>	<b>10</b>
Continuous knowledge checking (colloquia)	<b>20</b>	<b>32</b>
Final exam	<b>24</b>	<b>40</b>
<b>TOTAL</b>	<b>60</b>	<b>100</b>

**GRADING AND EVALUATION OF STUDENT WORK ON COURSES WITH SEMINARS and  
EXERCISES**

<b>Type of activity</b>	<b>Minimal number of points</b>	<b>Maximal number of points</b>
Attendance at seminars / exercises	<b>11</b>	<b>18</b>
Active participation in seminars and exercises	<b>5</b>	<b>10</b>
Continuous knowledge checking (colloquia)	<b>20</b>	<b>32</b>
Final exam	<b>24</b>	<b>40</b>
<b>TOTAL</b>	<b>60</b>	<b>100</b>