

UNIVERSITY OF ZAGREB
FACULTY OF VETERINARY MEDICINE
Heinzelova 55
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Division for basic and preclinical sciences
Department of Pathophysiology
Email: mrobic@vef.hr
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117432	REPUBLIKA HRVATSKA		
Veterinarski fakultet u Zagrebu			
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Klasifikacijska oznaka	Org. jed.		
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Urudžbeni broj	Prilozi	Vrijednost	
251-61-13-21-78	0	-	

COURSE SYLLABUS

Course name: Pathophysiology II

Academic year 2020-2021

Course leader: Prof. Mirna Robić, PhD; mrobic@vef.hr
Course vice-leader: Prof. Maja Belić, PhD; mbelic@vef.hr

Teachers: Prof. Romana Turk, PhD (rturk@vef.hr), Prof. Maja Belić, PhD (mbelic@vef.hr)

Associate: Sandra Kunštek, M.Sc. Biotech.

First day of classes: 22nd March 2021

Last day of classes: 8th June 2021

Timetable for LECTURES academic year 2020-2021

LECTURES				
Date	Methodological unit	Teacher	Location / time	Literature
22.03.21.	Metabolic disturbances: blood sugar homeostasis, hyperglycemia, hypoglycemia of piglets, ketosis	Prof. Mirna Robić	Practical Hall, Department of Pathophysiology 14-16	See obligatory and optional literature list
23.03.21.	Metabolic disturbances: starvation, disturbances in fatty acids, triglycerides and cholesterol metabolism	Prof. Mirna Robić	Practical Hall, Department of Pathophysiology 8-10	See obligatory and optional literature list
24.03.21.	Metabolic disturbances: lipids in blood and mechanisms of atherosclerosis development, Monday morning disease pathogenesis	Prof. Mirna Robić	Practical Hall, Department of Pathophysiology 12-13	See obligatory and optional literature list
24.03.21.	Liver and biliary system: disturbances in biotransformation mechanisms in liver, disturbances in bilirubin metabolism, mechanisms of icterus development	Prof. Romana Turk	Practical Hall, Department of Pathophysiology 13-14	See obligatory and optional literature list
29.03.21.	Liver and biliary system: mechanisms of fatty liver development	Prof. Romana Turk	Lecture Room, Department of Physiology and Radiobiology 12-14	See obligatory and optional literature list
12.04.21.	Liver and biliary system: mechanisms of ascites development	Prof. Romana Turk	Practical Hall, Department of Pathophysiology 12-14	See obligatory and optional literature list
15.04.21.	Disturbances in forestomachs digestion; disturbances in ruminal microflora balance,	Prof. Maja Belić	Practical Hall, Department of Pathophysiology, 10-12	See obligatory and optional literature list

	ruminal acidosis and alkalosis pathogenesis			
16.04.21.	Disturbances in forestomachs digestion; traumatic reticuloperitonitis pathogenesis, disturbances in eructation and ruminal tympany pathogenesis	Prof. Maja Belić	Practical Hall, Department of Pathophysiology, 14-16	See obligatory and optional literature list
30.04.21.	Disturbances in stomach digestion: disturbances in gastric peristaltic, vomiting, acute gastric dilatation, gastric ulcer pathogenesis	Prof. Maja Belić	Practical Hall, Department of Pathophysiology, 8-10	See obligatory and optional literature list
03.05.21.	Disturbances in motoric function and intestinal mobility in horses: neurovegetative dystonia, bacterial activity in large intestine, meteorism, diarrhea, obstipation	Prof. Maja Belić	Practical Hall, Department of Pathophysiology 12-14	See obligatory and optional literature list
05.05.21.	Disturbances in intestinal digestion and resorption: disturbances in intestinal and pancreatic juice secretion, malabsorption	Prof. Maja Belić	Practical Hall, Department of Pathophysiology, 12-14	See obligatory and optional literature list
11.05.21.	Hematopoietic system: regulation of erythropoiesis, classification of anemias, morphology changes, osmotic resistance and erythrocytes function.	Prof. Maja Belić	Practical Hall, Department of Pathophysiology, 13-15	See obligatory and optional literature list
14.05.21.	Hematopoietic system: causes of iron deficiency and toxicity of iron, anemia, disturbances	Prof. Maja Belić	Practical Hall, Department of Pathophysiology, 12-14	See obligatory and optional literature list

	in hemoglobin synthesis, regenerative blood count			
17.05.21.	Pathophysiology of shock	Prof. Mirna Robić	Practical Hall, Department of Pathophysiology 10-12	See obligatory and optional literature list
19.05.21.	Hematopoietic system: coagulation disorders, DIK, von Willebrandt disease, thrombocytopenia	Prof. Romana Turk	Practical Hall, Department of Pathophysiology, 11-13	See obligatory and optional literature list
20.05.21.	Renal mechanisms pathophysiology: regulation of renal mechanisms, classification of prerenal, renal and postrenal diseases. Prerenal insufficiency of kidneys, glomerular, vascular and tubulointerstitial kidney diseases	Prof. Romana Turk	Practical Hall, Department of Pathophysiology, 10-12	See obligatory and optional literature list
24.05.21.	Renal mechanisms pathophysiology: acute and chronic kidney insufficiency, uremic syndrome, nephrotic syndrome	Prof. Romana Turk	Practical Hall, Department of Pathophysiology, 12-14	See obligatory and optional literature list
26.05.21.	Disturbances in fluid and circulation transportation, cardiogenic and non-cardiogenic pulmonary edema, atelectasis, disturbances in breathing frequency and volume.	Prof. Mirna Robić	Practical Hall, Department of Pathophysiology 12-14	See obligatory and optional literature list
27.05.21.	Pulmonary volumes and capacities, protective mechanisms of respiratory tract, disturbances in alveolar	Prof. Mirna Robić	Practical Hall, Department of Pathophysiology, 11-12	See obligatory and optional literature list

	ventilation, asthma, chronic bronchitis, lung emphysema			
31.05.21.	Disturbances in heart function: hemodynamics and regulatory factors, disturbances in impulses generation in hearth, pathogenesis and forms of bradycardia and tachycardia, extrasystoles	Prof. Maja Belić	Practical Hall, Department of Pathophysiology, 12-14	See obligatory and optional literature list
01.06. 21.	Disturbances in heart function: valvular heart disease, heart failure, cardiac hypertrophy, dilatation and decompensation	Prof. Romana Turk	Practical Hall, Department of Pathophysiology, 12-14	See obligatory and optional literature list

Timetable for SEMINARS academic year 2020-2021

SEMINARS					
Date	Methodological unit	Teacher	Group	Location / time	Literature
02.06.21.	Individual presentation of selected themes	Prof. Romana Turk	1,2	Practical Hall, Department of Pathophysiology, 10-12	Printed and electronic teaching materials
07.06.21.	Individual presentation of selected themes	Prof. Maja Belić	1,2	Practical Hall, Department of Pathophysiology, 10-12	Printed and electronic teaching materials
08.06.21.	Individual presentation of selected themes	Prof. Mirna Robić	1,2	Practical Hall, Department of Pathophysiology, 8-10	Printed and electronic teaching materials

Timetable for PRACTICALS academic year 2020-2021

PRACTICALS						
Date	Methodological unit	Teacher	Type of practical	Group	Location / time	Literature
14.04.21.	Disturbances in lipid metabolism	Prof. Romana Turk	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 8-10	Printed and electronic teaching materials
15.04.21.	Clinical enzymology: diagnostic significance of enzymes in serum	Prof. Romana Turk	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 8-10	Printed and electronic teaching materials
28.04.21.	Disturbances in bilirubin metabolism: differential diagnostic of icterus, determination of bilirubin and interpretation	Prof. Maja Belić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 8-10	Printed and electronic teaching materials
29.04.21.	Laboratory diagnostics and biochemical urine analysis interpretation	Prof. Maja Belić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 8-10	Printed and electronic teaching materials CD-Atlas sedimenta mokraće, Chronolab
05.05.21.	Colloquium: diagnostic significance of biochemical blood and urine analysis	Prof. Mirna Robić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 8-10	Printed and electronic teaching materials
06.05.21.	Anatomy and physiology of hematopoietic system,	Prof. Mirna Robić	Clinical practicals	1,2	Practical Hall, Department of	CD-Atlas Laboratorijska hematologija

	development of blood cells in bone marrow				Pathophysiology, 14-16	Chronolab Printed and electronic teaching materials W.J. Reagan: Veterinary Hematology, Atlas of Common Domestic Species
07.05.21.	Hematological analyses and its application in determination of hematological disturbances. Methods of blood cells counting, determination of erythrocyte number	Prof. Romana Turk	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 13-15	Printed and electronic teaching materials
10.05.21.	Determination of erythrocyte sedimentation and PCV, changes and diagnostic significance in pathophysiological conditions	Prof. Maja Belić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 12-14	Printed and electronic teaching materials
12.05.21.	Determination of hemoglobin concentration, determination of erythrocyte constants and morphological classification of anemias	Prof. Maja Belić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 10-12	Printed and electronic teaching materials

13.05.21.	Determination of reticulocyte count, diagnostic significance, classification of regenerative and non-regenerative anemia	Prof. Romana Turk	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 10-12	Printed and electronic teaching materials
14.05.21.	Morphology of developmental forms of leukocytes, function of leukocytes	Prof. Mirna Robić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 10-12	Printed and electronic teaching materials W.J. Reagan: Veterinary Hematology, Atlas of Common Domestic Species
17.05.21.	Determination of leukocytes count, diagnostic significance of changes in total leukocytes number	Prof. Romana Turk	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology 8-10	Printed and electronic teaching materials W.J. Reagan: Veterinary Hematology, Atlas of Common Domestic Species
18.05.21.	Determination of eosinophils count, diagnostic significance of altered eosinophils count	Prof. Romana Turk	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 8-10	Printed and electronic teaching materials
18.05.21.	Differential blood count, making and staining blood smears	Prof. Maja Belić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 10-12	Printed and electronic teaching materials
20.05.21.	Determination of differential leukocytes count, diagnostic significance of qualitative and quantitative changes	Prof. Mirna Robić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 8-10	Printed and electronic teaching materials W.J. Reagan: Veterinary Hematology, Atlas of Common Domestic Species

21.05.21.	Determination of differential leukocytes count, diagnostic significance of qualitative and quantitative changes of erythrocytes	Prof. Romana Turk	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 11-13	Printed and electronic teaching materials
24.05.21.	Interpretation of altered values of total blood count of different animal species	Prof. Mirna Robić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 10-12	Printed and electronic teaching materials
25.05.21.	Changes of morphology of blood cells in neoplastic hematopoietic system diseases	Prof. Mirna Robić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 10-12	Printed and electronic teaching materials W.J. Reagan: Veterinary Hematology, Atlas of Common Domestic Species
26.05.21	Hematology of reptiles	Prof. Maja Belić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 10-12	Printed and electronic teaching materials
27.05.21	Hematology of birds	Prof. Maja Belić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 12-14	Printed and electronic teaching materials
28.05.21	Bone marrow smears preparation and	Prof. Mirna Robić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology 10-12	Printed and electronic teaching materials
31.05.21	Morphological features of differential blood count	Prof. Romana Turk	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 10-12	Printed and electronic teaching materials

01.06.21.	Practical colloquium: recognition of changes in blood cells morphology differential blood count	Prof. Maja Belić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 10-12	Printed and electronic teaching materials
02.06.21	Interpretation of hematological and biochemical laboratory findings	Prof. Maja Belić	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 8- 10	Printed and electronic teaching materials
07.06.21.	Colloquium: diagnostic significance of qualitative and quantitative changes in hematology	Prof. Romana Turk	Clinical practicals	1,2	Practical Hall, Department of Pathophysiology, 8- 10	Printed and electronic teaching materials

STUDENT OBLIGATIONS

Lecture attendance	Student must be present at least 20 hours of lectures to gain minimal three points. For each excused absence student will get back 0,154 points per hour. Maximal number of points for lecture attendance is six points.
Seminars attendance	Student must be present at least 4 hours of seminars to gain minimal four points. For each excused absence student can make up in agreement with seminar leader in written form and the points for attendance will be regained. Student can achieve maximum 6 points for seminar attendance.
Practicals attendance	Student must be present at least 34 hours of practicals to achieve minimal four points. Each excused absence within the limit (16 hours, i.e. 8 programs) student can make up in agreement with practical leader. After successful made up student will regain 0.12 points per hour. Maximal number of points, which can be achieved from practical attendance, is six points.
Active participation in seminars and practicals	Each attended, written and signed practical results in 0.2 points, finally maximal 5 points (25 programs x 0.2 = 5). During practicals, short oral knowledge checking will be performed and that maximal 2.5 points can be gained. During seminars student should prepare oral presentation with PowerPoint presentation of given topics and that way can gain maximal 2.5 points
Final exam	The final exam begins with results analysis of each evaluation element. For final exam attendance, student must gain minimum 16 points from attendance and activity on lectures, seminars and practicals, and minimal 20 points from continuous knowledge checking. Regardless to the final sumo of gained points until final exam, student must show sufficient knowledge at final exam. Minimal number of points which can be gained at final exam is 24, maximal is 40. If student did not show sufficient knowledge at final exam, she/he can access the exam in the next term. Final mark is formed based on total number of points from all elements of evaluation.
Examination requirements	Student requirements are defined in 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 assessment elements in order to take the final exam. Article 45: a student can justifiably be absent from up to 50 % of the lectures; 50% of the seminars and 30 % of the practicals.

GRADING AND EVALUATING STUDENT WORK

Continuous knowledge-checking (colloquium)	<p>2 written and 1 practical exam</p> <p>Three colloquiums will be performed in regular practicals terms:</p> <ol style="list-style-type: none"> 1. Written test from biochemical practicals will contain 6 questions. Each correct answer will be rewarded with two points. Minimal seven and maximal twelve points can be achieved. 2. Written test from hematological practicals will contain 16 questions. Each correctly answered question will be rewarded with one point. Minimal ten points must be achieved. 3. For practical exam from blood cells morphology, minimal three to maximal four points can be achieved. <p>Minimal number of total points (the sum of minimal points for passing first, second and third midterms) is 20, and maximal 32 points.</p> <p>For students who do not achieve minimal number of points for given colloquium, three additional colloquiums will be organized during academic year. Students who do not pass colloquiums in current academic year will lose the possibility to attend the colloquiums and must reapply the course to gain sufficient knowledge of practicals and possibility to attend the colloquiums in following academic year</p> <p>Dates of colloquiums will be 05.05.21., 01.06.21., 07.06.21.</p>
Final exams (dates)	23.04.2021., 24.05.2021., 14.06.2021., 08.07.2021., 06.09.2021., 20.09.2021.
Form of final exam	oral

LITERATURE

Obligatory literature	<p>Steven L. Stockham and Michael A. Scott (2008.): Fundamentals of Veterinary Clinical Pathology. Blackwell Publishing.</p> <p>Mary Anna Thrall (2004.): Veterinary Hematology and Clinical Chemistry. Lippincott Williams & Wilkins.</p> <p>Rick L. Cowell (2004.): Veterinary Clinical Pathology Secrets. Elsevier Mosby</p> <p>Harvey, J.W. (2001.): Atlas of Veterinary Hematology, Blood and Bone Marrow of Domestic Animals. W. B. Saunders Comp.</p> <p>Reagan, W.J., Sanders, T. G., DeNicola, D. B. (1998.): Veterinary Hematology: Atlas of Common Domestic Species, Iowa State University Press.</p> <p>CD- Atlas sedimenta mokraće, Chronolab</p> <p>CD – Atlas laboratorijska hematologija – Atlas analize razmaza periferne krvi.</p> <p>Weiss, D.J., K.J. Wardrop (2010): Schalm's veterinary hematology. 6th ed. Blackwell Publishing Ltd, Iowa, USA.</p> <p>Campbell, T., C. Ellis (2007): Avian and exotic animal hematology and cytology. 3rd ed., Blackwell Publishing Ltd, Iowa, USA.</p>
Optional literature	<p>Stjepan Gamulin, Matko Marušić, Zdenko Kovač i sur. (1988., 2002., 2011.): Patofiziologija. Medicinska naklada, Zagreb.</p> <p>Tatjana Božić (2007., 2012.): Patološka fiziologija domaćih životinja. Naučna KMD, Beograd.</p> <p>Romana Turk (2005.): Vježbe iz patofiziologije - biokemijski dio (interna skripta).</p> <p>Poljičak Milas Nina (2012.): Uvod u hematološke pretrage. Web predavanje, Veterinarski fakultet, Zagreb.</p> <p>Poljičak Milas Nina (2012.): Procjenjivanje eritrocitnih pokazatelja. Web predavanje, Veterinarski fakultet, Zagreb.</p> <p>Bilješke s predavanja i vježbi</p> <p>Robić Mirna (2016.): Bolesti poremećaja metabolizma. Web predavanje, Veterinarski fakultet, Zagreb.</p> <p>Printed teaching materials</p> <p>Reagan, W.J., Sanders, T. G., DeNicola, D. B. (1998.): Veterinary Hematology: Atlas of Common Domestic Species, Iowa State University Press.</p> <p>CD- Atlas sedimenta mokraće, Chronolab</p> <p>CD – Atlas laboratorijska hematologija – Atlas analize razmaza periferne krvi</p>

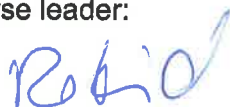
OBJECTIVES AND LEARNING OUTCOMES

Course objectives	The objectivity is gaining knowledge on mechanisms involved in development of pathophysiological processes in individual organs and organ systems on molecular and cellular level and tissue and organs levels which provides basis for understanding clinical courses including diagnose making, understanding the course of disease and choosing adequate therapy. Introspection in integrative pathophysiological mechanisms enables student to develop sense for integrative approach to pathological process at the whole organism level. Also, the objective of the course is to develop skills in laboratory diagnostic of pathological processes and interpretation of changes in laboratory findings and diagnose making
Learning outcomes	After successful mastering, student will be able to: <ol style="list-style-type: none">1. describe and explain pathophysiology of digestive tract, liver and biliary system diseases2. define metabolic disturbances3. describe and explain kidney disease pathophysiology4. describe and explain blood and hematological system disturbances5. describe and explain respiratory system disorders6. determine bilirubin concentration, liver enzymes function and evaluate liver status7. perform urinalysis and interpret results8. perform hematological analysis and interpret results

GRADING SCHEME

<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)

Course leader:



Prof. Mirna Robić

Head of Department/Clinic:



Prof. Romana Turk

Note: The course leader is required to submit a Course Syllabus to all teachers and associates pertaining to the Course.