

GENERAL INFORMATION		
Course	Physiology and Pathophysiology	
Course coordinator	Asst. Prof. Aleksandar Kibel, MD, PhD	
Assistant/Associate	Prof. Aleksandra Dugandžić, MD, PhD Assoc. Prof. Stela Živčić-Ćosić, MD, PhD Prof. Dóra Zelena, MD, PhD Assoc. Prof. Rita Gálosi, MD, PhD Assoc. Prof. Péter Buzás, MD, PhD Asst. Prof. Tamás Ollman, MD, PhD Asst. Prof. Ildikó Telkes, MD, PhD Asst. Prof. Eszter Mikó-Baráth, MD, PhD Vedran Đambić, MD Tea Taslak, MD Matea Vinković, MD Irena Vlahović, MD	
Study Programme	Integrated undergraduate and graduate university study of Medicine in German language	
Status of the course	Mandatory	
Year of study, semester	2 nd year, 3 rd semester	
Grading scale and workload	ECTS credits	16
	Hours (L+S+E)	235 (90+75+70)
COURSE DESCRIPTION		
Course objectives		
To enable the student to master the curriculum in physiology and pathophysiology. Respiratory system physiology, cardiovascular system physiology, digestive system physiology, metabolism physiology, urinary system physiology, endocrine glands physiology. Pathophysiology of homeostasis, general principles of disease and directed pathophysiology of all organ systems with their connection and integration at the level of the whole organism, i.e., the patient with his/her organic, psychological and social characteristics.		
Enrolment requirements and entry competencies		
Passed exams: Medical Biology, Medical Chemistry, Medical Biochemistry, Medical Physics and Biophysics, Anatomy 1 and 2, Histology.		
Learning outcomes at the Programme level		
1.1., 2.1., 3.1., 3.5., 4.2		
Learning outcomes (5-10)		
Knowledge		

1. Describe and explain the most important functional features of the neuromuscular, cardiovascular, respiratory, renal, digestive, metabolic, endocrinological, blood and reproductive system at the level of cells, organs and the whole organism
2. Describe, analyse and discuss the control mechanisms (negative and positive feedback loops) necessary to maintain homeostasis
3. Explain the mechanisms of communication and the integrative functions of individual organ systems
4. Enumerate and discuss the changes that occur in each organ system if there is a deviation of the parameter values within or outside the physiological limits
5. Describe and explain functional tests in the assessment of the state of the organism, general principles of biological systems assessment, analyse clinical and laboratory tests, and describe the principles of interpretation of laboratory tests and assessment of the general state of the organism
6. Classify and describe the most important etiological factors that cause disorders of organ systems, and analyse the mechanisms of their harmful effects
7. Describe and explain the general patterns of the organism's reaction to noxa, and describe and analyse the branching of basic pathophysiological processes in the organism's systemic reaction
8. Explain the influence of genetic inheritance, environmental factors and risk factors on the etiopathogenesis of various pathological conditions
9. Distinguish and interpret pathophysiological disorders typical for single functional units, as well as for the whole organism
10. Explain and discuss the changes that occur when there are disturbances in the control mechanisms (positive and negative feedback loops) of single organ systems, as well as the whole organism
11. List, describe and explain the clinical features associated with certain pathophysiological processes in different pathological conditions
12. Relate acquired knowledge with clinical problems and describe the pathogenetic bases of rational therapy and diagnostics

Skills

1. Carry out clotting tests, analyse and interpret the results
2. Measure arterial blood pressure and interpret the results
3. Perform the ECG recording procedure, analyse and interpret the basic principles of a normal ECG
4. Carry out basic measurements of respiratory function and stress tests, analyse and interpret the results
5. Carry out the glucose tolerance test, analyse and interpret the results of the cell types
6. Work out the pathogenesis of various pathophysiological processes with algorithms in case examples, through clinical and preclinical exercises
7. Integrate and combine previous knowledge and conclude about the nature of the patient's pathophysiological response
8. Explain and critically interpret functional tests in the assessment of various pathological conditions

Homeostatic mechanisms. Health and disease. Integrative approach to disease. Principles of pathogenetic mechanisms and the origin of the diseases. Haematopoiesis. Body fluids. Components of cellular and extracellular fluid. Blood components. Physiology of red blood cells. Biological membranes, solutes and solutions. Transfer of substances through the cell membrane. Channels and transmembrane transmission systems. Membrane and action potential. Transmembrane signal transmission and signal molecules. Supervision of cell growth. Disorders of energy metabolism. Malignant transformation and growth. Disorders of the erythroid lineage. Disorders of the leukocyte lineage. Blood groups and blood transfusion. Endogenous biological compounds in the pathophysiological process. Inflammation. Haemostasis and blood clotting. Haemostasis disorders. Body temperature regulation. Thermoregulation disorders; pathogenesis of fever. The cell and its function. DNA disorders. Disorders of structure and function of macromolecules. Disorders of subcellular structures. Disorders of the structure and function of the blood and hematopoietic organs. Introduction to the cardiovascular system. Physiology of the heart muscle. The cardiac cycle. Membrane and action potential. Rhythmic excitation of the heart. Vector analysis and normal ECG. Cardiac arrhythmias and their ECG interpretation. General overview of circulation. Regulation of blood flow and arterial pressure. Coronary circulation and ischemic heart disease; Heart failure. Disorders of arterial pressure and pulse. Circulatory shock. Overview of renal system functions (Part 1). Overview of renal system functions (Part 2). Overview of renal function disorders. Overview of respiratory functions. Overview of respiratory disorders. Regulation and disorders of acid-base balance. Body fluids and oedema. Physiology of the digestive system. Pathophysiology of the digestive system. Eating disorders. Protein and carbohydrate metabolism. Lipid metabolism. Physiology of the liver. Pathophysiology of the liver - Part I. Pathophysiology of the liver - Part II. Exocrine pancreatic functions – acute and chronic pancreatitis. Introduction to endocrinology, pituitary hormones. Metabolic hormones of the thyroid gland. Hormones of the adrenal cortex. Parathyroid hormone, calcitonin, calcium and phosphate metabolism. Insulin, glucagon and diabetes mellitus. Predictors and clinical implications of metabolic syndrome. Reproductive functions and sex hormones. Overall reaction of the organism to a noxa

Mode of teaching	<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> independent tasks
	<input checked="" type="checkbox"/> seminars and workshops	<input checked="" type="checkbox"/> multimedia and network
	<input checked="" type="checkbox"/> exercises	<input type="checkbox"/> laboratory
	<input type="checkbox"/> distance learning	<input type="checkbox"/> mentoring
	<input type="checkbox"/> field teaching	<input type="checkbox"/> other

Student obligations

Attending all classes, as well as taking all the examinations are mandatory. However, students are allowed for excused absences, totalling up to 30 % of all classes.

The student is obliged to actively participate in all forms of classes. Students must prepare themselves for the classes in advance. Exercises can only be attended in prescribed work clothes (white lab coat). Classes are held at the prescribed time. It is not allowed to bring food and drinks to the exercises. It is forbidden to use mobile phones during classes as well as during exams.

Monitoring student work

Attending classes	x	Activity during class	x	Seminar work		Experimental work	
Written exam	x	Oral exam	x	Essay		Research	
Project		Continuous knowledge verification	x	Paper		Practical work	x

Portfolio						
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Grading and evaluation of student work during classes and of the final examination

Teaching activity	ECTS	Learning outcome	Student activity	Assessment methods	Grade points	
					Min.	Max.
Attending classes	0.5	1-12	Class attendance, Seminar work	Attendance records Presentation	11	19
Seminar	3	1-12				
Exercise	2.5	1-12	Entry colloquium, participation in exercise classes, exercise workbook	Exercise workbook, entry colloquium		
Exam (partial test)	4.5	1-12	Studying for partial tests	3 partial tests	18	42
Final exam	5.5	1-12	Studying for final exam	Written exam, oral exam	21	39
Total	16				50	100

The activity and participation of students in class is evaluated. Participants are required to take a written and oral exam, and the final grade includes all components of student activity monitoring. From all elements of monitoring and examinations, a student can achieve a maximum of 100 grade points, which makes up 100 % of the grade. For a passing grade, the student must obtain a minimum of 50 grade points or 50 % of the grade.

Calculation of final grade:

Based on the total sum of the points awarded during the course and the final exam, the final grade is determined according to the following distribution:
 A – excellent (5): 80-100 grade points; B – very good (4): 70-79,99 grade points; C – good (3): 60-69,99 grade points; D – sufficient (2): 50-59,99 grade points

Required reading

1. Brandes R., Lang F., Schmidt RF. Physiologie des Menschen: mit Pathophysiologie, Springer-Lehrbuch 32. Auflage, 2019
2. Blum H.E., Müller-Wieland D. Klinische Pathophysiologie, Thieme, 11. Auflage 2020

Additional reading

1. Silbernagl, S., Despopoulos A, Draguhn A. Taschenatlas Physiologie, 9. Auflage, Georg Thieme Verlag KG, 2018
2. Silbernagl, S., Lang, F. Taschenatlas der Pathophysiologie, 6. Auflage, Georg Thieme Verlag KG, 2020
3. Guyton and Hall Textbook of Medical Physiology, 14th Edition, 2020, Elsevier
4. Harrisons Innere Medizin 2017 | 19., ABW Wissenschaftsverlagsgesellschaft

Number of copies of required literature in relation to the number of students currently attending classes in the course

<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>

Course evaluation procedures

Anonymous, quantitative, standardized student survey providing feedback on the course as well as on the work of course coordinators and their assistants/associates is being conducted by the QA Office of the Faculty of medicine Osijek, and a unique university survey conducted by the QA Office of the J.J. Strossmayer University in Osijek