

Code: MFSE 0502	Course title: Pathophysiology 1		
Level: preclinical	Study year: III	Semester: V	ECTS: 5
Status: obligatory	Total contact hours: 75		
Prerequisites:	According to the Study Regulation		
Lecturers: Professors and associates involved in the implementation of the course in accordance with the plan of the teaching process			
1. Overall aim	The aim of the Pathophysiology 1 course is to give students knowledge about the disease, etiology, pathogenesis, local circulatory disorders, fever, disorders of immunity and disorders of metabolic processes.		
2. Course contents	Module 1. Mechanisms of the beginning, development and outcome of the disease. Module 2. The effects of xenobiotics, biological, psychological and etiological factors, the role of heredity in the onset of the disease. Module 3. The effects of thermal environmental factors, the basic pathophysiological mechanisms of electricity and radiation. Module 4. The effects of physical etiological factors, effects of changed atmospheric pressure. Module 5. The pathophysiological mechanisms of immunity, allergies and autoimmune diseases. Module 6. The pathophysiological mechanisms of local blood flow, hypoxia and fever. Module 7. The pathophysiological mechanisms of the energy balance and metabolic disorders.		
3. Learning outcomes (Knowledge, skills and competences)	Students will acquire information and basic knowledge to recognize functional changes between cells, tissues, and organs, and to understand the pathophysiological mechanisms of the disease. After completing the course, the student will learn the basic medical terminology and be able to adequately present the medical facts, understand the etiology and pathogenesis of basic metabolic and functional disorders of organs and organ systems; be able to link the clinical manifestation of the causes and mechanisms of their formation and have a pathophysiological basis for understanding the mechanisms of the disease. <i>Through the lectures and seminars, the students will acquire the following knowledge and competences:</i> <div><div>1.</div><div>Learn basic pathophysiological mechanisms of origin, development and outcome of the disease</div></div> <div><div>2.</div><div>Discover basic pathophysiological mechanisms of action of xenobiotics, biological, psycho-social and hereditary etiological factors on the body.</div></div> <div><div>3.</div><div>Understand basic pathophysiological mechanisms of thermal environmental factors, basic pathophysiological mechanisms of electricity and radiation effects</div></div> <div><div>4.</div><div>Recognize pathophysiological mechanisms of how physical and</div></div>		

	<p>etiological factors effect the body, and an activity-altered atmospheric pressure</p> <ol style="list-style-type: none"> 5. Analyze basic pathophysiological mechanisms of immunity, allergies, autoimmune diseases. 6. Learn pathophysiological mechanisms and local blood flow, hypoxia and fever. 7. Be introduced to basic pathophysiological mechanisms of disorders of the energy transport and metabolic disorders. <p><i>Through the practical laboratory work, the students will acquire the following skills:</i></p> <ul style="list-style-type: none"> - Functional testing of the cardiovascular system - hemodynamics disorders, disorders of blood pressure and pulse <ul style="list-style-type: none"> • Harward – step test • Schellong 1 test • Schellong 2 test • Ruffier test - Pathophysiology of ischemic pain - Markers of inflammation - Disorders of acid-base status - Electrocardiography <ul style="list-style-type: none"> • Introduction, disorders of the electric axis of the heart • Rhythm disorders • Identification of conduction disorders • Characteristics of hypertrophy • Acute coronary syndromes • Myocardial infarction - Functional testing of the respiratory system - testing pulmonary ventilation <ul style="list-style-type: none"> • Obstructive ventilatory disorders • Restrictive ventilatory disorders
4. Teaching methods	<p>Lectures: 30 hours Seminars: 15 hours Laboratory work: 30 hours</p>
5. Method of knowledge assessment and examination	<p>Continuous knowledge assessment</p> <p>Seminars</p> <p>During the course duration the students will be tested several times. The maximum number of points is 5.</p> <p>Practical work</p> <p>The verification of acquired skills through practical exercises will be carried out continuously through the three colloquia. The maximum number of points is 35:</p> <ul style="list-style-type: none"> • Colloquium 1 - maximum 10 points; passing minimum 5,5 points. • Colloquium 2 - maximum 15 points; passing minimum 8,2 points. • Colloquium 3 - maximum 10 points; passing minimum 5,5 points.

The structure of the colloquium:

1. MCQ
2. Essays
3. Questions with amendments.

The points from the colloquia are added to other points after both partial exams. The colloquia which student failed during the course, can be retaken on the final and the repeated exam.

Partial exam 1

The partial exam includes modules 1, 2, 3 and 4, and is structured in two parts: the written and the oral parts. The written part is in the form of an MCQ test with 10 questions. The student can score the maximum of 10 points. A student who acquires 55% on the test takes an oral exam which consists of 3 questions. The maximum number of points on the oral exam is 20. Seminars are part of the test and the oral exam. The maximum number of points on the partial exam 1 is 30 (MCQ test 10 points + the oral exam 20 points).

Partial exam 2

The partial exam 2 includes modules 5, 6, and 7. It is structured in two parts: the written and the oral exams. The written part is in the form of an MCQ test with 10 questions. The student can score the maximum of 10 points. A student who acquires 55% on the test takes an oral exam which consists of 3 questions. The maximum number of points on the oral exam is 20. Seminars are part of the test and the oral exam.

Final exam

The final exam consists of those parts the student did not pass during the course. The final exam has the same structure as the partial exams.

The written test – 20 questions:

MCQ test 1 - 10 questions (modules 1, 2, 3, and 4)

MCQ test 2 - 10 questions (modules 5, 6, and 7).

A student who scores 55% on both tests takes the oral exam with 6 questions from the modules which were parts of the partial exams. The maximum number of points on the final exam is 60.

A student who has passed certain parts of the course, on the final exam passes the remaining parts.

The repeated and correction exams

The repeated and correction exams are conducted according to the previously defined criteria of the final exam.

Final score is obtained on the basis of the sum of points achieved during the course:

1. Seminars – maximum 5 points.
2. Colloquia – maximum 35 points.

	3. Partial exams – maximum 60 points.
6. Literature	<p>Recommended:</p> <ol style="list-style-type: none"> 1. Matko Marušić, Zdenko Kovač, Stjepan Gamulin. Pathophysiology. Zagreb: Medicinska naklada; 2013. 2. Kubishkin A.V. General and clinical pathophysiology. Vinnytsia: Nova Knyha Publishers 2011. 3. Gary D. Hammer, Stephen J. McPhee, Pathophysiology of Disease. 7th ed. New York: McGraw-Hill Education; 2014. 4. Almir Fajkić. A textbook of practical pathophysiology. Sarajevo: Medical faculty University of Sarajevo; 2018. <p>Additional:</p> <ol style="list-style-type: none"> 1. McCance LK, Huether ES. Pathophysiology. The Biologic Basis for Disease in Adults and Children, 6th ed. St. Louis: Mosby; 2010.

COURSE PLAN: PATHOPHYSIOLOGY 1

Week	Form of Instructions and materials	Number of classes
1.	Lectures: Subject of Pathophysiology. Objectives of Pathophysiology. Purpose of Pathophysiology. Health and disease. Periods of disease (latency, onset of disease, manifestations of disease, outcomes of disease). Etiology. Description of main etiological factors. Pathogenesis. Pathological reactions. Pathological process. Pathological condition.	2
	Laboratory practical work: Functional testing of the cardiovascular system - hemodynamics disorders, disorders of blood pressure and pulse. <ul style="list-style-type: none"> – Harvard Step test – Schellong 1 test – Schellong 2 test – Ruffier test 	2
	Seminar: Resuscitation, Sanogenesis	1
2.	Lectures: The role of hereditary factors in the development of the disease: the role of constitution and diathesis. The action of psychosocial etiological factors.	2
	Seminar: Pathophysiology of pain	1
	Laboratory practical work: Pathophysiology of pain <ul style="list-style-type: none"> – Ischemic pain 	2
3.	Lectures: The pathophysiological effects of chemical and biological etiological factors.	2
	Seminar: Pathophysiology of inflammation	1
	Laboratory practical work: Markers of inflammation Erythrocyte sedimentation rate (ESR)	2
4.	Lectures: Thermoregulation dysfunction. Hyperthermia. Causes. Disorders in organism in hyperthermia. Hypothermia. Causes. Disorders in organism in hypothermia. Application of hypothermia in medicine.	2
	Seminar: Clinical signs of hypothermia and hyperthermia	1
	Laboratory practical work: Pathophysiology of acid base disorders. Problem: Pathophysiology of acute respiratory alkalosis	2
5.	Lectures: Pathophysiology of radiation exposure. The effects of non-ionizing and ionizing radiation. Acute and chronic radiation sickness. The effect of electricity.	2

	Seminar: Pathophysiology of malignant transformation and growth	1
	Laboratory practical work: Colloquium 1	2
6.	Lectures: Function of external physical factors: acceleration and kinetosis, vibration, sound and ultrasound. The effect of modified atmospheric pressure. Seminar: Evaluation and functional aspects of various types of shock Laboratory practical work: Electrocardiography. Introduction.	2 1 2
7.	Lectures and Seminar - Partial exam 1 Laboratory practical work: Electrocardiographic characteristics of rhythm disorders- nomotopic and heterotopic disorders	2+1 2
8.	Lectures: Typical disorders of the immune system. Immunopathological states: allergy, conditions and diseases of immune autoaggression, immune deficiency states, pathological tolerance. Autoimmunity and autoimmune diseases. Seminar: Immunodeficiency disorders Laboratory practical work: Electrocardiographic characteristics of conduction disorders	2 1 2
9.	Lectures: Disorders of microcirculation Hypoxia Seminar: Thromboembolism Laboratory practical work: Electrocardiographic characteristics of hypertrophy	2 1 2
10.	Lectures: Pathophysiology of fever Pathophysiology of metabolism – starvation Seminar: Obesity Laboratory practical work: Electrocardiographic characteristics of acute coronary syndrome	2 1 2
11.	Lectures: Pathophysiology of carbohydrate metabolism. Causes and consequences of carbohydrate digestion disorders. Hyperglycemia. Hypoglycemia. Disorders of carbohydrate intermediary metabolism. Seminar: Diabetes mellitus Laboratory practical work: Colloquium 2	2 1 2

12.	<p>Lectures: Pathophysiology of lipid metabolism. Hyperlipidemia.</p> <p>Pathophysiology of protein metabolism. Dysproteinemia types and features.</p> <p>Seminar: Atherosclerosis.</p> <p>Laboratory practical work: Functional testing of the respiratory system. Spirometry.</p>	<p>2</p> <p>1</p> <p>2</p>
13.	<p>Lectures: Pathophysiology of water-electrolyte and mineral balance. Negative water-electrolyte balance. Hypo-, iso- and hyperosmolaric types of dehydration. Positive water-electrolyte balance. Types of hyperhydration.</p> <p>Seminar: Pathogenesis and classification of edema.</p> <p>Laboratory practical work: Spirometric characteristics of obstructive and restrictive ventilation disorders</p>	<p>2</p> <p>1</p> <p>2</p>
14.	<p>Lectures: Acid-base disorders. Acidosis and alkalosis.</p> <p>Pathophysiology of metabolism of vitamins. Deficiency of water-soluble vitamins (B1, B2, B6, B12, C, PP). Deficiency of fat-soluble vitamins (A, D, E, K).</p> <p>Seminar: Disorders of metabolism of minerals (Na, K, Ca, P) and microelements (F, J, Cu, Se, Mn).</p> <p>Laboratory practical work: Problem: Pathophysiology of bronchial asthma</p>	<p>2</p> <p>1</p> <p>2</p>
15.	<p>Lecture and Seminar- Partial exam 2</p> <p>Laboratory practical work: Colloquium 3</p>	<p>2+1</p> <p>2</p>
Week 17.-18.	Final exam	
Week 19.-20.	Re-sit exam	