

<b>Study program:</b> Integrated academic studies in Medicine
<b>Course title:</b> Pathophysiology
<b>Teacher:</b> Mirjana J. Đerić, Gorana P. Mitić, Velibor S. Čabarkapa, Biljana A. Vučković, Radmila R. Žeravica, Branislava P. Ilinčić, Romana R. Mijović
<b>Course status:</b> compulsory
<b>ECTS Credits:</b> 14
<b>Condition:</b> Anatomy, Histology and Embryology (entrance); Medical Chemistry, Medical Biochemistry, Physiology (exam)
<p><b>Course aim</b></p> <p>Studying of the properties of particular etiological factors, their interactions with particular structures of the organism and how they lead to the initiation of the pathological process. Understanding the general principles of organ and organ system disorders. Studying the pathogenesis of the processes at the level of molecules, subcellular structures and cells; the onset of humoral and tissue functional disorders, as well as functional disorders of different organs and organ systems, with the aim of successful transition from preclinical to clinical disciplines. Introduction to the basic principles of functional tests used in the diagnostic procedure for determining changes in the function of a diseased organ or the whole organism.</p>
<p><b>Expected outcome of the course:</b></p> <p><b>Knowledge:</b> Training students to identify the causative agents of the disease, understanding the mechanisms of the onset of impaired function in the diseased organ and organ system, how to respond and adapt the diseased organism and pathophysiological disorders leading to appropriate clinical manifestations of the disease.</p> <p><b>Skills:</b> Training students in order to understand the basic principles of performing individual laboratory and functional tests (chemical, hematologic, cytological, immunometric, physical and nuclear medical tests) used in modern laboratory diagnostics, procedures for obtaining different biological material as well as methods of patient preparation. Training to use the most important parameters of functional tests and the movement of their values in various pathophysiological disorders, diseases and pathological conditions. Training to interpret the findings of individual functional tests.</p>
<p><b>Course description</b></p> <p><i>Theoretical education</i></p> <ul style="list-style-type: none"> <li>– Introduction to pathophysiology. Health and disease as dynamic processes. Stages of disease development. Etiological factors in diseases. Etiology and pathogenesis of the disease. Inflammation. Fever. Disorders of barriers and phagocyte functions.</li> <li>– Immune response disorders as an etiological factor of the disease. Immunodeficiencies. Autoimmunity and autoimmune diseases. Hypersensitivity reactions. Mechanism of emergence and reaction patterns in early and late type hypersensitivity. Transplantation immunology.</li> <li>– Heritage as an etiological factor of disease.</li> <li>– Lifetime as an etiological factor of disease.</li> <li>– Chemical etiological factors.</li> <li>– Malignant neoplasia as an etiological factor of the disease.</li> <li>– Eating disorders as an etiological factor of the disease. Energy balance disorders. Vitamin metabolism disorders. The role of enzymes in the etiopathogenesis of the disease and clinical diagnosis.</li> <li>– Protein metabolism disorders. Serum protein metabolism disorders. Disorders of other proteins. Disorders of heteroprotein metabolism.</li> <li>– Disorders of carbohydrate metabolism. Etiology, pathogenesis, and stages of diabetes mellitus development. Hypoglycemic conditions and their consequences. Glycogenoses and renal glycosuria.</li> <li>– Disorders of lipid metabolism. Hyperlipoproteinemia. Hypolipoproteinemia. Dyslipoproteinemia. Pathogenesis of atherosclerosis.</li> <li>– Disorders of body fluid metabolism. Isoionia disorders. Disorders of acid-base balance.</li> <li>– Physical etiological factors. General and local effects of cold. General and local effect of heat. Mechanical factors. The effect of changes in atmospheric pressure. The effect of acceleration and deceleration. The effect of radiation. The effect of electric current and electromagnetic waves. The effect of vibration, sound and ultrasound.</li> <li>– Pathophysiology of the cardiovascular system. Etiology and pathogenesis of heart failure. Heart defects. Heart rhythm disorders. Myocardial diseases. Pulmonary blood disorders. Systemic blood flow disorders. Disorders of regional and peripheral circulation.</li> <li>– Pathophysiology of the respiratory system. Signs and symptoms of the disease. Pulmonary ventilation disorders. Diffusion disorders. Perfusion disorders. Respiratory failure. Pathophysiology of tissue hypoxia and reserve adaptive mechanisms.</li> </ul>

- Pathophysiology of the digestive tract. General motor and passage disorders in the digestive tract. Secretory function disorders. Absorption disorders. Common pathophysiological mechanisms in the gastrointestinal system.
- Liver pathophysiology. Etiopathogenesis of liver failure. Pathophysiological consequences of liver failure. Pathophysiology of gallbladder and biliary tract dysfunction.
- Pathophysiology of the kidney. Urinary syndrome. Acute kidney failure. Chronic kidney failure. Glomerular kidney disease. Tubulointerstitial kidney disease. Renal hypertension. Nephrolithiasis.
- Pathophysiology of the neuroendocrine system. Disorders of nervous and humoral regulation. Hypothalamus and pituitary disorders. Thyroid disorders. Calcium homeostasis, calcitropic mediators and bone metabolism. Adrenal disorders. Glandular function disorders.
- Pathophysiology of the blood. Pathophysiology of the red blood cells. Pathophysiology of white blood cells. Pathophysiology of the hemostatic system.
- Pathophysiology of the locomotor system. Pathophysiology of muscles and joints. Degenerative diseases. Pathophysiology of connective tissue.
- Pathophysiology of the nervous system. Disorders of motor and sensory functions. Somatosensory system disorders. Pathophysiology of pain. Disorders of the cerebral circulation. Epilepsy. Disorders of consciousness.

#### *Practical education*

- Functional testing in medicine.
- Functional testing of inflammation.
- Functional testing of protein metabolism.
- Functional testing of carbohydrate metabolism.
- Functional testing of lipid metabolism.
- Functional testing of metabolism of body fluids, electrolytes and acid-base balance.
- Functional testing of the immune system.
- Functional examination of the pituitary gland.
- Functional testing of the thyroid gland.
- Functional examination of the adrenal glands.
- Functional testing of the gonad glands.
- Functional examination of parathyroid glands, calcium metabolism and bone metabolism.
- Functional testing of the red blood cells.
- Functional testing of white blood cells.
- Functional testing of the hemostatic system.
- Functional testing of the respiratory system.
- Functional testing of the cardiovascular system.
- Functional testing of the digestive tract.
- Functional examination of the liver and biliary tract.
- Functional testing of the nervous system.
- Laboratory diagnostics of malignant neoplasms.
- Functional examination of the kidney.

Knowledge assessment is required through a test at the end of each semester.

#### **Literature**

##### *Compulsory*

1. McCance KL, Huether SE. Pathophysiology: The Biologic Basis for Disease in Adults and Children, 8th Edition. Edinburg: Elsevier; 2018.
2. Hammer GH, Mc Phee JS. Pathophysiology of disease. An Introduction to Clinical Medicine, 7th ed. New York: McGraw-Hill Education; 2014.
3. Đerić M, ed. Practical Handbook of Pathophysiology. [CD-ROM] Novi Sad: Faculty of Medicine; 2019.

##### *Additional*

1. Silbernagl S, Lang F. Color Atlas of Pathophysiology. Stuttgart: Thieme; 2016.
2. Huether SE, Mc Cance KL. Understanding Pathophysiology. 6th edition. St. Louis, Missouri: Elsevier; 2016.
3. Norris TL, Lalchandani R. Porth's Pathophysiology: Concepts of Altered Health States. Tenth Edition. Philadelphia: Wolters Kluwer; 2019.

<b>Number of active classes</b>	<b>Theoretical classes: 90</b>		<b>Practical classes: 120</b>
<b>Teaching methods:</b> interactive theoretical and practical education; consultation; seminars; pre test consultation.			
<b>Student activity assessment (maximally 100 points)</b>			
<b>Pre-exam activities</b>	<b>points</b>	<b>Final exam</b>	<b>points</b>
Lectures	10	Written	15

Practices	10	Oral	45
Colloquium	10	.....	
Essay	10		