Name of the course	**Pathophysiology**			**Code**	
Type of study program *Cycle*	Integrated university study, medicine			**Year of study**	**2022/2023**
Credits (ECTS) :		*Semester* *V*		Number of hours per semester (l+e+s)	**Total: 135** **L45+E30+S60**
Status of the course:	mandatory	*Preconditions:*		*Comparative conditions:*	/
Access to course:	Third year students			*Hours of instructions*:	According to schedule

Course teacher:	Prof. dr. sc. Zlatko Trobonjača, full professor
Consultations:	As agreed with students
E-mail address and phone number:	zlatko.trobonjaca@uniri.hr
Associate teachers	Prof. dr. sc. Hrvoje Jakovac, full professor Mr. sc. Borko Rajić, dr. med. Mr. sc. Marija Šandrk, dr. med. Benjamin Palić, dr. med. Ivana Bjelanović, dr. med. Ante Mandić, dr. med.
Consultations:	As agreed with students
E-mail address and phone number:	hrvoje.jakovac@medri.uniri.hr borkorajic@gmail.com marija.sandrk@gmail.com benjamin314palic@gmail.com bjelanovic.ivanaaa@yahoo.com ante.mandic@live.com
The aims of the course:	The aims of the course are: The main aim of this course is to enable students to apply the previously acquired knowledge from all subjects of the first two years of study, especially from the course of Physiology, in order to acquire knowledge about pathological function of certain organ systems and etiopathogenetic mechanisms leading to dysfunction and disease occurrence. The course is performed in the winter semester at the third year of study, in the form of lectures (34 teaching hours), seminars (60 teaching hours), and practicals (30 teaching hours). Lectures last 2, and seminars and practicals 3 teaching hours. A) Lectures are a form of classes that provide an introduction and an overview of a thematic unit that is taught in more detail on seminars and practicals. B) Seminars and C) practicals are a form of classes where students actively review and critically discuss physiological and pathophysiological mechanisms (of certain morphological and functional units), which are then explained at the molecular, microenvironmental, organic, systemic and whole-organism level. Active participation of students in the curriculum program is further achieved by D) studying natural integrators of etiopathogenetic

	events, the so-called etiopathogenetic clusters, E) performing practicals in the laboratory and on computer programs that simulate pathological conditions and provide clinical correlates of certain diseases
Learning outcomes (general and specific competences):	General outcomes 1. To develop the ability to integrally consider and explain the role and the consequences of the disturbed homeostatic processes in the body 2. To develop the ability to individually use literature, critically evaluate media or scientific publications about normal and pathological function of human organism, correctly use arguments and competently discuss about pathophysiological issues 3. To become qualified to use Internet and to be able to obtain information from other electronical resources 4. To improve the idea about interdisciplinary nature of biomedical sciences 5. To gain the knowledge necessary for professional development and medical carrier (independent work, work and time consume planning, organisational skills) 6. To improve the level of oral and written communication which will enable them to explain and discuss the meaning and the range of medical knowledge and to communicate with patients 7. To be able to evaluate the significance of modern biomedical techniques in the development of science and business, particularly in the field of biotechnology Specific outcomes To adopt the principles of physiological feedback and determine the homeostatic mechanisms of the main functional systems. To understand functional tests in the assessment of the disorders, general principles of assessment of biological systems, the role of clinical laboratory tests, the concept of the reference value, principles of interpretation of laboratory tests and assessment of the general state of the organism. To define health and disease and understand the principles of maintaining normal and disturbed homeostasis. To explain positive feedback and homeostatic regulation by multiple relations. Relationship between negative and positive feedback loops in disease development. To understand and explain the limits of fluctuation of physiological values, the principles of adjustment and adaptation, reactivity, the meaning of the constitution, the pathobiological concept of anabiosis and catabiosis. To explain the terms etiology, pathogenesis and etiological factors. To understand the development of the pathological process, the influence of time factors in pathogenesis, heredity, environment and risk factors. To explain the disease as a nosological entity and the characteristics of the disease. Define death. To understand the basic properties of inflammation and explain the etiopathogenesis of acute and chronic inflammation. To clarify the systemic reaction of the organism to inflammation.

	To know how to assess the inflammatory reaction. To understand the principles of chromosomal disorders. To explain gene expression disorders. To explain disorders of protein formation and breakdown (transcriptional and translational disorders, disorders of intracellular protein breakdown). To explain disorders of DNA structure and function, DNA damage, disorders of DNA repair mechanisms, changes in DNA structure, disorders of DNA quantity and disorders of DNA synthesis. To understand the pathophysiological principles of inheritance of diseases and syndromes. To explain the principles of hereditary metabolic diseases. To explain the origin of protein folding diseases (amyloidosis, prion diseases). To explain disorders of the cell membrane, structure and function of mitochondria, lysosomes and other intracellular organelles To understand the integral response of the cell to injury To explain cell death To explain the methods of assessing the function of subcellular structures To define the term allergy, state the classification of immune hypersensitivities and describe their main features Describe atopic reactions and the principles of their treatment Describe the main erythrocyte antigens and know the types of agglutinins in plasma. Explain the AB0 antigen system and the Rh system. Understand the development of fetal erythroblastosis. Understand the basic principles of the transplantation reaction. Determine blood groups according to the AB0 and Rh systems. To describe the role of the MHC genes in determining the characteristics of immunoreactivity (in monitoring the response to certain antigens, in the occurrence of autoimmune diseases, in the occurrence of high alloreactivity) To define levels of immunogenetic relations To describe the principles of determination, and the practical, clinical and biological importance of matching of tissue antigens To explain the principles of transplantation immunology To explain the mechanisms of the transplant reaction, provide evidence that the transplant reaction is an immune reaction To state and describe the forms of transplant reaction depending on the speed and mechanism of rejection, and describe the reaction of mixed lymphocytes To explain the features of transplanting non-lymphatic tissues and organs, and transplanting xenogenic organs

	To explain the features of lymph tissue (bone marrow) transplantation, graft-versus-recipient reaction, and transplant disease To define immunodeficiency and indicate its clasiffication To explain primary immunodeficiencies and disorders of the immune effectors that belong to them (deficiencies of B lymphocytes, T lymphocytes, phagocytes, the complement system, and combined deficiencies of T and B lymphocytes) To explain secondary immunodeficiencies, the reasons why they occur To explain the concept of autoimmunity, the mechanisms of autoimmunity (the role of autoantigens, the role of external antigen as an immunogenic carrier, describe the cross-reaction) To describe the features of the appearance of autoreactive T and B lymphocytes in the periphery To explain the pathogenetic mechanisms of autoimmunity and the mechanisms of tissue and organ damage by antibodies, antigen-antibody complexes and T lymphocytes To describe autoimmune diseases and their division, genetic factors of autoimmunity, influence of gender, age, infections and immune disorders on the occurrence of autoimmunity Sto sate the principles of treatment of autoimmune diseases To explain the principles of carcinogenesis and the influence of chemical, physical and biological carcinogens. To explain the action of oncogenes and anti-oncogenes, the transformation of proto-oncogenes into oncogenes of this type and the role of tumor suppressor genes. To understand etiopathogenetic factors of malignant transformation of human cells. To explain the properties of malignant cells, the main genetic disorders in malignant cells, the kinetics of malignant growth, tumor growth and metastases. Using the example of colorectal cancer, explain the formation of a malignant tumor, the role of genetic disorders in transformation and the formation of metastases. To understand clonal tumor growth, local factors influencing tumor growth and metastasis, and paraneoplastic disorders. To explain the role of proto-oncogenes in the control of cell growth and the principles of transformation into oncogenes. To explain disorders in the formation and function of erythrocytes. To explain the pathogenesis of anemia and polycythemia. To understand the metabolism and pathophysiological consequences of iron turnover. To know the basic laboratory tests for evaluating the number and function of erythrocytes. To describe the causes and basic features of qualitative and quantitative disorders of leukocytes. To explain etiopathogenetic features and division of leukemias and lymphomas. To understand the principles of creation and action of the main endogenous biologically active compounds: biogenic amines, plasmakinin system and complement, phospholipid derivatives, renin-angiotensin system, cytokines, gastrointestinal

	hormones and neuropeptides, atrial natriuretic peptide, endothelin and nitrogen monoxide, oxygen radicals. To explain disorders in the function of the myocardium. To describe etiopathogenetic types of cardiomyopathies. To describe the consequences of heart valve damage. To explain the causes of pathologically high and low cardiac output values. To describe heart filling disorders and the consequences of cardiac output disorders. To describe the peculiarities of coronary flow. To describe coronary blood flow disorders and the pathogenesis of ischemic heart disease. To describe the biochemical, mechanical and electrophysiological consequences of ischemia. To know the mechanisms of reflected pain. To describe conduction disorders: atrial and atrioventricular blocks. To describe complex disturbances in the rhythm. To clarify the mechanisms of flutter and fibrillation. To explain the consequences of atrial and ventricular fibrillation. To describe rhythm disturbances in the EKG. To describe the types of heart load and its adaptation. To describe the dynamics of cardiac hypertrophy. To describe the pathogenetic mechanisms of heart failure. To describe the differences between a compensated and a decompensated heart To describe the mechanisms and symptoms of unilateral and bilateral heart failure Using the example of heart failure, explain the overall monitoring of cardiac output and venous return. To describe disorders of body hydration To describe the pathogenetic effects of hydration disorders To explain Starling's capillary law and its disorders. To describe the formation of cellular and extracellular edema. To know the pathogenetic classification of edema. To describe sodium transport disorders To describe potassium transport disorders and their pathophysiological consequences To know the forms of acid-base balance disorders and their etiopathogenesis To explain the pathophysiological consequences of acid-base balance disorders and the principles of their assessment. To describe the intensity of metabolism.

	To understand the principles of hypoxic hypoenergosis, dysenzymic hypoenergosis, substrate hypoenergosis and assessment of energy metabolism. To explain the mechanisms of maintaining normal body temperature. To describe the organism's response to temperature changes in the environment. To explain the pathogenetic causes, course and consequences of hyperthermia and hypothermia. To explain the basic pathogenetic mechanisms of hypertension. To describe the mechanisms of essential hypertension and secondary hypertension. To describe the consequences of hypertension and accompanying changes in the ECG To explain the pathogenetic mechanisms of circulatory shock. To define compensated and decompensated circulatory shock To explain the symptomatology of blood flow collapse in individual organs. To explain the basic principles of therapy of circulatory shock. To describe the mechanisms of prerenal, renal and postrenal kidney failure. To describe the compensatory mechanisms of maintaining normal glomerular filtration and blood flow through the kidney. To describe the pathogenesis of glomerulonephritis and nephrotic syndrome. To understand the pathogenesis of acute and chronic kidney failure. To explain the occurrence of changes in the amount and composition of urine. To explain disorders in lung ventilation. To know the pathogenesis of gas diffusion disorders and disorders of fluid circulation and blood flow in the lungs. To explain disorders in the rhythm of breathing. To know the differences between hypoxemic and hypercapnic forms of respiratory insufficiency. To describe disorders of lung metabolic functions. To know the mechanisms of obstructive and restrictive lung diseases. To describe the general disorders of aging. To describe specific disorders of the function of individual organs in aging. To describe the disorders of the throat, esophagus, and stomach. To explain the disorders of the exocrine pancreatic function. To describe the disorders of the small and large intestine. To explain the pathophysiological forms and consequences of diarrhea. To explain the mechanism and consequences of vomiting. To describe the causes and consequences of ileus. To describe cystic fibrosis of the pancreas.

	To explain the ethiopathogenic factors, course, and complications of (local, systemic) acute pancreatitis. To understand the mechanisms of creation, secretion and metabolic effects of insulin, glucagon and somatostatin. To explain the causes and consequences of insulin, glucagon and somatostatin disorders. To understand the etiopathogenesis of different types of diabetes. To explain the course and acute and chronic consequences of diabetes. To understand the causes and consequences of increased and decreased hormone secretion. To understand the causes and consequences of disorders in the target tissue of hormones. To explain disorders of hormone metabolism and regulation of hormonal systems. To explain disorders of the function of the anterior and posterior lobes of the pituitary gland. To understand thyroid function disorders: thyrotoxicosis, hyperthyroidism, hypothyroidism, goiter. To explain the creation, secretion and physiological functions of adrenal cortex hormones. To understand the causes, course and consequences of hyperfunction and hypofunction of the adrenal cortex. To understand disorders of the adrenal medulla. To understand the chemical structure, secretion, metabolism and effects of male sex hormones. To describe disorders of male sexual functions. To understand the functional anatomy of the female genital organs. To describe the system of female sex hormones. To describe the monthly ovarian cycle and the function of gonadotropic hormones. To clarify the functions of ovarian hormones, estradiol and progesterone. To describe disorders of female sexual functions. To understand the mechanisms of maintenance of calcium and phosphate metabolism. To explain disorders of calcium, phosphate and magnesium circulation. To explain disorders with increased and decreased production of parathyroid hormone. To explain disorders with increased and decreased calcitonin production. To describe hypocalcemia and hypercalcemia and their effects. To describe disorders of urinary calcium excretion. To describe disorders of phosphate and magnesium transport. To explain the etiopathogenesis of disorders of the circulation of specific metabolic substances. To understand disorders of vitamin metabolism (hypovitaminosis, hypervitaminosis).

	To understand disorders of the exchange of trace elements. To describe disorders of the structure and function of connective and metabolic diseases of bone tissue To describe the strategy of the organism's systemic pathobiological response to noxious stimuli. To explain stress - spontaneous systematic direction of reactivity. To describe the acute-phase response during the inflammatory process. To understand the systemic inflammatory response and multisystem organ failure. To describe immune patterns of systemic response. To understand healing and fibrosis processes and changes in tissue architecture (remodeling). To describe the causes, mechanisms, and pathophysiological effects of lipoprotein disorders (primary and secondary hyperlipoproteinemia, other disorders of lipoprotein metabolism). To describe the causes, mechanisms, and pathophysiological effects of lipid deposition disorders (lipidosis, atherosclerosis, and obesity). To explain the etiopathogenesis of metabolic and infiltrative liver diseases (metabolic disorders of bilirubin, jaundice, fatty liver). To understand the etiopathogenesis of viral hepatitis (A, B, C, D, E) and autoimmune hepatitis. To define toxic and medicated damage to the liver. To explain the pathogenesis of alcoholic liver disease. To explain the eiopathogenetic factors, course, and complications of chronic pancreatitis. To understand thyroid function disorders: thyrotoxicosis, hyperthyroidism, hypothyroidism, and goiter. To explain disorders with increased or decreased parathyroid hormone formation. To explain disorders with increased or decreased calcitonin formation. To define the components of the metabolic syndrome. To describe the inherited and acquired etiopathogenetic factors of the metabolic syndrome. To define the role of obesity (adipokine production and release of nonesterified fatty acids from adipose tissue and their action and ectopic accumulation in muscle tissue, liver, and pancreas) in the development of the metabolic syndrome. To describe the mechanisms and the role of atherogenic dyslipidemia, hypertension, hyperglycemia, prothrombotic, and failure status in the development of cardiovascular diseases. To describe the disorders of male sexual functions. To understand the functional anatomy of female genitalia. To describe the female sex hormone system.

	To describe the monthly ovarian cycle and the function of gonadotropic hormones. To clarify the ovarian hormone functions, estradiol and progesterone. To describe the interaction of ovarian and hypothalamic-pituitary hormones. To explain the female sexual act. To describe pregnancy, lactation, and the physiology of the fetus and newborn. To explain the pathogenetic causes, course, and consequences of hyperthermia and hypothermia. To describe the etiology of disorders of neurovegetative regulation To describe primary and secondary disorders of the autonomic nervous system To explain circadian rhythm disorders To describe the role of the neurovegetative system in complex clinical conditions To know the degrees of consciousness disorders To describe the types of coma and the mechanisms of their formation To explain the etiopathogenesis of syncope			
Course content (Syllabus):	Annexes: calendar classes			
Format of instruction (mark in bold)	**Lectures**	**Exercises**	**Seminars**	Independent assignments
	Consultations	Work with mentor	Field work	Other
Student responsibilities	Class attendance and student participation in all forms of classes are compulsory in accordance with the Law and the Statute of the Faculty of Medicine in Mostar. Accordingly, student attendance at lectures, seminars, and practicals will be regularly checked. Only justifiable absences due to, for example, illness will be acceptable within the limits allowed and according to the Ordinance on Studies. The student is obligated to prepare in advance the predefined material that is being discussed on seminars and practicals. The teacher/course coordinator continuously evaluates student participation throughout seminars and practicals (demonstrated knowledge, the ability to correlate morphological, ultrastructural, biochemical and/or functional factors into a complete image of physiological functional systems and certain diseased states). Student activity during classes (lectures, seminars, practicals) is certified in the daily work log			
Screening student work	**Class attendance**	**Class participations**	Seminar essay	Practical training

(mark in bold)	**Oral exam**	**Written exam**	**Continuous assessment**	Essay

Detailed evaluation within a *European system of points*

STUDENTS RESPONSIBILITIES	**HOURS**	**PROPORTIONS OF ECTS CREDITS**	**PROPORTIONS OF GRADE**
Class attendance and participations			10
Seminar essay			
Written exam			55
Oral exam			35
Total			

Further clarification:

Student work will be evaluated during classes and at the final exam. A maximum of **(I) 30 grade points** can be obtained during classes and up to **(II) 70 grade points** at the final exam, which totals **100 grade points**.

I. The following components are evaluated during classes (up to 30 grade points):

1) acquired knowledge **(up to 20 grade points)**
2) active participation in classes **(up to 10 grade points)**

1) acquired knowledge (up to 20 grade points)

During classes, acquired knowledge will be evaluated by means of **two midterm tests comprising 50 questions.** Test will be held on:

(I) 12. january 2023. from 10,30 to 11,30 hours

(II) 27. january 2023. from 13,00 do 14,00 hours

A student may obtain up to **10 grade points** on each test as follows:

Correct answers	**Grade points**
48-50	**10**
45-47	**9**
42-44	**8**
39-41	**7**
36-38	**6**
33-35	**5**
30-32	**4**
27-29	**3**
24-26	**2**
21-23	**1**

2) active participation in classes (up to 10 grade points)

Based on oral discussions and/or written tests, student knowledge is graded at all seminar and practical classes. A students can obtain grade points during classes only if they were **graded** at least on 10 seminars and 5 practicals. Students will be graded in the range from 1 to 5. The score scale is determined according to the absolute distribution of mean values of grades, which is achieved by summing all grades from seminars and exercises (a total of 30 teaching

units) and dividing by number 30 (or less if the student was justifiably absent or not graded). The obtained average grade is converted into grade points as shown in the table:

4,26-5,0	**10 points**
3,76-4,25	**8 points**
3,26-3,75	**6 points**
2,76-3,25	**4 points**
2,00-2,75	**2 points**

II. Final exam (up to 70 grade points):

The final exam consists of an oral and a written part. A student must solve **at least 50% of the test** in order to access the oral part of the final exam.

Who can NOT access the final exam:

Students who missed 30% or more teaching hours. Such a student cannot take the final exam, i.e. he/she must re-enroll the course in the following academic years.

Student can obtain a maximum of 70 grade points at the written part of the final exam (100 questions) that corresponds to the total number of grade points as shown in the table:

Correct answers	**Grade points**		Correct answers	**Grade points**
97-100	**70**		68-69	**57**
94-96	**69**		66-67	**56**
91-93	**68**		64-65	**54**
88-90	**67**		62-63	**52**
86-87	**66**		60-61	**50**
84-85	**65**		58-59	**48**
82-83	**64**		56-57	**46**
80-81	**63**		54-55	**44**
78-79	**62**		52-53	**42**
76-77	**61**		50-51	**40**
74-75	**60**		<50	**0**
72-73	**59**			
70-71	**58**			

III. The final grade (a maximum of 100 grade points)

The final grade represents the sum of all grade points obtained during classes and at the final exam. It is based on the absolute distribution according to the following scale:

A (91-100 grade points)	**excellent (5)**
B (79-90- grade points)	**very good (4)**
C (67-78 grade points)	**good (3)**
D (55-66 grade points)	**sufficient (2)**
F (student who has solved less than 55% of the test at the final exam)	**insufficient (1)**

IV. The final grade obtained on the written test has to be confirmed at the oral exam

Required literature:	1. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. 2. Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. 3. Kovač Z. et al. Clinical Pathophysiology – Etiopathogenetic Nodes (Third Book: I-IV part). Medicinska naklada Zagreb 2013.
Optional literature:	**1. Ganong, W.F. Review of Medical Physiology,** (21st edition) Lange Medical Books / McGraw-Hill, Medical Pub. Division, New York 2004. **2. Vrhovac B. et al. Interna medicina [Internal Medicine],** (4th edition), Naklada Ljevak, Zagreb 2008. **3. McPhee,S.J, Ganong, W.F. Pathophysiology of Disease. An introduction to Clinical medicine,** (5th edition), Lange Medical Books / McGraw-Hill, Medical Pub. Division, New York 2006.
Additional information about the course	

Annexes: calendar classes

List of lectures:

The number of teaching units	**TOPICS AND LITERATURE**
I.	Title: **Lecture 1: Introduction to pathophysiology. General causes and development of pathophysiological processes. Homeostatic maintenance and disorders. Health and disease. An integrative approach to the disease.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 19.-38.
II.	Title: **Lecture 2: Principles of the pathogenetic mechanisms.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 38.-74.
III.	Title: **Lecture 3: Inflammation.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 760.-803. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 455.-463.
IV.	Title: **Lecture 4: Endogenous bioactive compaunds in disease processes.**
	Short description:

	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 551.-611.
V.	Title: **Lecture 5: Immunopathophysiology. Immunopathogenetic role of the HLA system. Tissue transplant reactions.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 682-695 and 739.-753.
VI.	Title: **Lecture 6: Immunodeficiencies. Autoimmunity.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 705.-733.
VII.	Title: **Lecture 7: Malignant transformation and growth. Disorders of energy metabolism.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 208-246 and 938.-988.
VIII.	Title: **Lecture 8: Red blood cells disorders.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1148.-1164. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 452.-453.
IX.	Title: **Lecture 9: White blood cells disorders.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1164.-1180. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 463.-464..
X.	Title: **Lecture 10: Disorders of myocardial function. Disorders of the heart valve function. Congenital heart defects. Cardiac filling disorders. Cardiac output disorders.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014.Pages: 1209.-1239., 1267.-1271. and 1302.-1309. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 248.-258. and 283.-291.
XI.	Title: **Lecture 11. The coronary circulation and ischemic heart disease.**
	Short description:

	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1253.-1267. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 262.-269.
XII.	Title: **Lecture 12. Disorders of arterial pressure. Hypertension. Local tissue perfusion disorders.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1309.-1326. i 1333.-1348. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 232.-241.
XIII.	Title: **Lecture 13. Circulatory Shock.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 843.-861. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 293.-302.
XIV.	Title: **Lecture 14. Overview of the renal functions disorders.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014.Pages: 1388.-1434. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 427.-441.
XV.	Title: **Lecture 15. Overview of the respiratory system disorders.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1351.-1385. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 549.-557.
XVI.	Title: **Lecture 16. Chronobiological pathophysiology.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 885.-933.
XVII.	Title: **Lecture 17. Pathophysiology of gastrointestinal system.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1453.-1487. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 843.-849.
XVIII.	Title: **Lecture 18. Disorders of pancreatic endocrine function. Diabetes mellitus.**
	Short description:

	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 250.-265. and 536. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 994.-999.
XIX.	Title: **Lecture 19. Integral organismic reactions to noxious stimuli.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 804.-841.
XX.	Title: **Lecture 20. Causes of endocrinopathies. Disorders of pituitary function. Thyroid gland disorders.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 494.-526. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 946.-948. i 959.-963.
XXI.	Title: **Lecture 21. Functional disorders of the cortex and medulla of the adrenal gland.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 526.-536. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 979.-981.
XXII.	Title: **Lecture 22. Disorders of gonadal function.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 539.-544. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages:1033.-1034. and 1051.-1054
XXIII.	Title: **Lecture 23. Disorders of parathyroid glands function. Disorders of calcium, phosphate and magnesium metabolism.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 424.-438. and 536.-539. and 354 Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages:1014.-1016.

List of seminars:

The number of teaching units	**TOPICS AND LITERATURE**

I.	Title: **Seminar 1: Pathophysiology of DNA: DNA damages, chromosomal aberrations, genomic instability. Gene expression disorders. Hereditary metabolic disases.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 77.-151.
II.	Title: **Seminar 2: Functional disorders of subcellular structures.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 160.-201.
III.	Title: **Seminar 3: Function and composition disorders of blood and hematopoetic organs.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1148.-1194. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 452.-453. and 490.-493.
IV.	Title: **Seminar 4: Immune hypersensitivities and transfusion reactions.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 733.-739. i 749.-753.
V.	Title: **Seminar 5. Disorders of impulse conduction. Heart rhytm disorders. Heart adaptation to the functional load.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1239.-1253. i 1271.-1281. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 155.-165.
VI.	Title: **Seminar 6. Cardiac Failure.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1281.-1294. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 271.-280.
VII.	Title: **Seminar 7. Disorders of arterial pressure and blood flow.**
	Short description:

	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1309.-1344. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 232.-241.
VIII.	Title: **Seminar 8. Circulatory Shock.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 843.-861. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 293.-302.
IX.	Title: **Seminar 9. Disorders of osmolality and hydration of the body. Disorders of extracellular fluid distribution.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 383.-403. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 312.-320.
X.	Title: **Seminar 10. Disorders of urine quantity and composition.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1434.-1445.
XI.	Title: **Seminar 11. Pathophysiology of the respiratory system.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1351.-1385.. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 549.-557. and 515.
XII.	Title: **Seminar 12. Disorders of electrolytic homeostasis.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 403.-424.
XIII.	Title: **Seminar 13. Acid-base balance disorders.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 449.-487. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 421.-426.
XIV.	Title: **Seminar 14. Disorders of metabolism of proteins and carbohydrates. Disorders of dietary balances.**

	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 250.-265. i 291.-308. i 223.-234. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 894.-897.
XV.	Title: **Seminar 15. Lipid metabolism disorders. Atherosclerosis.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 265.-291. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 994.-999. i 872.-874.
XVI.	Title: **Seminar 16. Pathophysiology of the liver.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1493.-1536.
XVII.	Title: **Seminar 17. Disorders of energy metabolism. Disorders of thermoregulation.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 208.-246. and 661.-681. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 919.-922.
XVIII.	Title: **Seminar 18. Disorders of specific metabolic substances.** **Short description:**
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 328.-376.
XIX.	Title: **Seminar 19. Structural and functional disorders of connective and bone tissue.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1125.-1144.
XX.	Title: **Seminar 20. Disorders of neurovegetative regulation. Disorders of consciousness.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 614.-635. i 864.-881.

List of practicals:

The number of teaching units	**TOPICS AND LITERATURE**

I.	Title: **Practical 1: Leukocytes and the monocyte-macrophage system disorders. Biological etiological factors.**
	The pathogenesis of multiple organ failure, sepsis and SIRS
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1164.-1180. i 1088.-1122.
II.	Title: **Practical 2. Physical and chemical etiological factors.**
	Mushroom poisoning-acute liver failure
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 993.-1043. i 1050.-1085.
III.	Title: **Practical 3: Disorders of the composition and structure of plasma protein. Function disorders of the spleen. Haematological laboratory tests.**
	Pathological fracture + Hyperviscosity of blood
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1194.-1206.
IV.	Title: **Practical 4: Hemostasis and blood clotting disorders.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1180.-1194.
V.	Title: **Practical 5. Electrocardiographic interpretation of disorders of the heart muscle and coronary circulation - Vectorial analysis**
	Short description:
	Literature: Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 139.-153.
VI.	Title: **Practical 6. Cardiac arrhythmias and their electrocardiographic Interpretation. Pathological electrocardiogram.**
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1239.-1253. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 155.-165.
VII.	Title: **Practical 7. Disorders of the digestive system and metabolism.**
	I. Teoretical part:
	To understand the material discussed in lectures (L17.) and seminars (S14., S15, S16.). This material comprises the pathophysiology of the digestive system, impaired metabolism of proteins, carbohydrates and lipids, and nutritive disorders.
	Etiopathogenetic cases:
	a) Pathophysiology of gluten enteropathy.
	b) Pathogenesis of diarrhea in cholera syndrome
	c) Pathophysiology of peptic disease in gastrinoma (Zollinger - Ellis syndrome).
	Etiopathogenetic nodes: Hypoglycemia + Hyperglycemia
	Short description:

	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 250.-314. and 1453.-1487. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 846.-849. i 872.-874. i 894.-897. i 994.-999.
VIII.	Title: **Practical 8. Pathophysiology of the liver and exocrine pancreas.**
	I. Teoretical part:
	To understand the material discussed in the lecture and seminar (L17 and S16). This material covers the field of pathophysiology of the hepatobiliary system and the field of pathophysiology of the exocrine pancreas.
	Etiopathogenetic cases:
	a) Pathophysiology of liver cirrhosis.
	b) Pathophysiology of obstructive jaundice caused by cholelithiasis.
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 1493.-1537. i 1474.-1478.
IX.	Title: **Practical 9. Disorders of conception, pregnancy, fetal growth and development. Disorders of sexual function.**
	I. Teoretical part:
	To understand the material discussed in the lecture (L21.). This material covers the area of pathophysiology of reproductive functions and sex hormones.
	Etiopathogenetic cases:
	a) Pathophysiology of postmenopausal osteoporosis.
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 539.-544. i 885.-919. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 1051.-1053.
X.	Title: **Practical 10. Endocrinopathies.**
	I. Teoretical part:
	Understand the material discussed in the lectures (contents L19., L20., L21 and L22.) This material covers the field of pathophysiology of general endocrinology, pituitary hormones, metabolic hormones of the thyroid gland, adrenal cortex hormones, parathyroid hormone and calcitonin.
	Etiopathogenetic cases:
	a) Pathophysiology of hyperfunctional thyroid adenoma.
	Short description:
	Literature: Gamulin S., Marušić M., Kovač Z. Pathophysiology (7th edition), Medicinska naklada Zagreb, 2014. Pages: 497.-539. Guyton A.C., Hall J.E. Textbook of Medical Physiology (13th edition), Elsevier, 2016. Pages: 946.-948. i 960.-963. i 979.-981. i 1014.-1016.

COURSE SCHEDULE

Pathophysiology

Academic year: 2022./2023.

Study: Medicine

Course Coordinator: Prof. dr. sc. Zlatko Trobonjača, dr. med.

Date	Title of Lectures / Seminars / Practicals	Teaching	Groups	Lecturer
05. 12. 2022. Lect 1 (08,30-10,00)	**Introduction to pathophysiology. General causes and development of pathophysiological processes. Homeostatic maintenance and disorders. Health and disease. An integrative approach to the disease.**	On-line	Group A	Prof. dr. sc. Zlatko Trobonjača
05.12. 2022. Sem1 (13,00-15,15)	**Pathophysiology of DNA: DNA damages, chromosomal aberrations, genomic instability. Gene expression disorders. Hereditary metabolic diseases.**	On-site	Group A	Mr. sc. Borko Rajić, dr. med.
05. 12. 2022. Pract 1 (15,30-17,45)	**Leukocytes and the monocyte-macrophage system disorders. Biological etiological factors.**	On-site	Group A	Mr. sc. Borko Rajić, dr. med.
06.12.2022. Lect 2 (08,30-10,00)	**Principles of the pathogenetic mechanisms.**	On-line	Group A	Prof. dr. sc. Zlatko Trobonjača
06. 12. 2022. Pract 2 (11,00-13,15)	**Physical and chemical etiological factors.**	On-site	Group A	Ivana Bjelanović Glibo, dr. med.
07.12.2022. Lect 3 (08,30-10,00)	**Inflammation.**	On-line	Group A	Prof. dr. sc. Zlatko Trobonjača
07.12.2022. Sem 2 (11,00-13,15)	**Functional disorders of subcellular structures.**	On-site	Group A	Benjamin Palić, dr. med.
08.12.2022. Lect 4 (12,15-13,45)	**Endogenous bioactive compaunds in disease processes.**	On-line	Group A	Prof. dr. sc. Zlatko Trobonjača
08.12.2022. Pract 3 (14,00-16,15)	**Disorders of the composition and structure of plasma protein. Function disorders of the spleen. Haematological laboratory tests.**	On-site	Group A	Mr. sc. Marija Šandrk, dr. med.
09.12.2022. Lect 5 (8,30-10,00)	**Immunopathophysiology. Immunopathogenetic role of the HLA system. Tissue transplant reactions.**	On-line	Group A	Prof. dr. sc. Zlatko Trobonjača
09.12.2022. Sem 3 (11,00-13,15)	**Function and composition disorders of blood and hematopoetic organs.**	On-site	Group A	Benjamin Palić, dr. med.

12.12.2022. Lect 6 (13,00-14,30)	**Immunodeficiencies. Autoimmunity.**	On-site	Group A	Prof. dr. sc. Zlatko Trobonjača
12.12.2022. Sem 4 (14,45-17,00)	**Immune hypersensitivities and transfusion reactions.**	On-site	Group A	Prof. dr. sc. Zlatko Trobonjača
13. 12. 2022. Lect 7 (13,00 -14,30)	**Malignant transformation and growth. Disorders of energy metabolism.**	On-site	Group A	Prof. dr. sc. Zlatko Trobonjača
13. 12. 2022. Pract 4 (14,45-17,00)	**Hemostasis and blood clotting disorders.**	On-site	Group A	Mr. sc. Marija Šandrk, dr. med.
14. 12. 2022. Lectr 8 (13,00-14,30)	**Red blood cells disorders.**	On-line	Group A	Prof. dr. sc. Zlatko Trobonjača
14. 12. 2022. Lect 9 (14,45-16,15)	**White blood cells disorders.**	On-line	Group A	Prof. dr. sc. Zlatko Trobonjača
15. 12. 2022. Lect 10 (14,00-15,30)	**Disorders of myocardial function. Disorders of the heart valve function. Congenital heart defects. Cardiac filling disorders. Cardiac output disorders.**	On-line	Group A	Prof. dr. sc. Zlatko Trobonjača
15. 12. 2022. Sem 5 (15,45-18,00)	**Disorders of impulse conduction. Heart rhytm disorders. Heart adaptation to the functional load.**	On-line	Group A	Prof. dr. sc. Zlatko Trobonjača
16. 12. 2022. Pract 5 (13,00-15,15)	**Electrocardiographic interpretation of disorders of the heart muscle and coronary circulation - Vectorial analysis**	On-line	Group A	Ante Mandić, dr. med.
16. 12. 2022. Lect 11 (15,30-17,45)	**The coronary circulation and ischemic heart disease.**	On-line	Group A	Prof. dr. sc. Zlatko Trobonjača
19.12.2022. Pract 6 (13,00-15,15)	**Cardiac arrhythmias and their electrocardiographic Interpretation. Pathological electrocardiogram.**	On-line	Group A	Ante Mandić, dr. med.
19. 12. 2022. Sem 6 (15,30-17,45)	**Cardiac Failure.**	On-line	Group A	Prof. dr. sc. Zlatko Trobonjača
20.12.2022. Sem 7 (10,15-13,30)	**Disorders of arterial pressure and blood flow.**	On-line	Group A	Mr. sc. Borko Rajić, dr. med.
20.12.2022. Lect 12 (13,45-15,15)	**Disorders of arterial pressure. Hypertension. Local tissue perfusion disorders.**	On-line	Group A	Prof. dr. sc. Zlatko Trobonjača

21.12.2022. Sem 9 (10,30-12,45)	**Disorders of osmolality and hydration of the body. Disorders of extracellular fluid distribution.**	**On-line**	Group A	Mr. sc. Borko Rajić, dr. med.
21.12.2022. Lect 13 (13,00-14,30)	**Circulatory Shock.**	**On-line**	Group A	Prof. dr. sc. Zlatko Trobonjača
21.12.2022. Sem 8 (14,45-17,00)	**Circulatory Shock.**	**On-line**	Group A	Mr. sc. Marija Šandrk, dr. med.
		Christmas and New Year holidays		
09.01.2023. Lect 14 (15,30-17,00)	**Overview of the renal functions disorders.**	**On-line**	Group A	Prof. dr. sc. Zlatko Trobonjača
10.01.2023. Sem 10 (13,00-15,15)	**Disorders of urine quantity and composition.**	**On-line**	Group A	Prof. dr. sc. Zlatko Trobonjača
10.01.2023. Sem 12 (15,30-17,45)	**Disorders of electrolytic homeostasis.**	**On-line**	Group A	Mr. sc. Borko Rajić, dr. med.
11.01.2023. Lect 15 (13,00-14,30)	**Overview of the respiratory system disorders.**	**On-line**	Group A	Prof. dr. sc. Zlatko Trobonjača
11.01.2023. Sem 11 (14,45-17,00)	**Pathophysiology of the respiratory system.**	**On-line**	Group A	Mr. sc. Borko Rajić, dr. med.
12. 01. 2023. Sem 13 (13,30-15,45)	**Acid-base balance disorders.**	**On-site**	Group A	Prof. dr. sc. Zlatko Trobonjača
12.01.2023. Lect 16 (08,30-10,00)	**Chronobiological pathophysiology.**	**On-site**	Group A	Prof. dr. sc. Zlatko Trobonjača
12.01.2023. (10,30-11,30)	**Midterm exam I**	**On-site**	Group A	Prof. dr. sc. Zlatko Trobonjača Doc. dr. Slavica Ćorić Mr. sc. Borko Rajić Mr. sc. Marija Šandrk, dr. med. Ivana Bjelanović, dr. med. Benjamin Palić, dr. med.
16. 01. 2023. Lect 17 (13,00-14,30)	**Pathophysiology of gastrointestinal system.**	**On-site**	Group A	Prof. dr. sc. Hrvoje Jakovac, dr. med.

16. 01. 2023. Sem 14 (14,45-17,00)	**Disorders of metabolism of proteins and carbohydrates. Disorders of dietary balances.**	**On-site**	Group A	Mr. sc. Marija Šandrk, dr. med.
17. 01. 2023. Lect 18 (13,00-14,30)	**Disorders of pancreatic endocrine function. Diabetes mellitus.**	**On-site**	Group A	Prof. dr. sc. Hrvoje Jakovac, dr. med.
17. 01. 2023. Pract 7 (14,45-17,00)	**Disorders of the digestive system and metabolism.**	**On-site**	Group A	Prof. dr. sc. Hrvoje Jakovac, dr. med.
18. 01. 2023. Sem 15 (13,30-15,45)	**Lipid metabolism disorders. Atherosclerosis.**	**On-site**	Group A	Prof. dr. sc. Hrvoje Jakovac, dr. med.
19. 01. 2023. Sem 16 (13,45-16,00)	**Pathophysiology of the liver.**	**On-site**	Group A	Prof. dr. sc. Hrvoje Jakovac, dr. med.
19. 01. 2023. Pract 8 (16,15-18,30)	**Pathophysiology of the liver and exocrine pancreas.**	**On-site**	Group A	Ivana Bjelanović, dr. med.
20. 01. 2023. Sem 17 (11,00-13,15)	**Disorders of energy metabolism. Disorders of thermoregulation.**	**On-site**	Group A	Prof. dr. sc. Hrvoje Jakovac, dr. med.
20. 01. 2023. Lect 19 (13,30-15,00)	**Integral organismic reactions to noxious stimuli.**	**On-site**	Group A	Prof. dr. sc. Hrvoje Jakovac, dr. med.
23. 01. 2023. Lect 20 (13,00-14,30)	**Causes of endocrinopathies. Disorders of pituitary function. Thyroid gland disorders.**	**On-site**	Group A	Prof. dr. sc. Hrvoje Jakovac, dr. med.
23. 01. 2023. Sem 18 (14,45-17,00)	**Disorders of specific metabolic substances.**	**On-site**	Group A	Mr. sc. Marija Šandrk, dr. med.
24. 01. 2023. Pract 9 (08,30-10,45)	**Disorders of conception, pregnancy, fetal growth and development. Disorders of sexual function.**	**On-site**	Group A	Mr. sc. Marija Šandrk, dr. med.
24. 01. 2023. Sem 19 (11,00-13,15)	**Structural and functional disorders of connective and bone tissue.**	**On-site**	Group A	Mr. sc. Borko Rajić, dr. med.
24. 01. 2023. Lect 21 (13,30-15,00)	**Functional disorders of the cortex and medulla of the adrenal gland.**	**On-site**	Group A	Prof. dr. sc. Hrvoje Jakovac, dr. med.
25. 01. 2023. Pract 10 (13,00-15,15)	**Endocrinopathies.**	**On-site**	Group A	Prof. dr. sc. Hrvoje Jakovac, dr. med.

25. 01. 2023. Lect 22 (15,30-17,00)	**Disorders of gonadal function.**	**On-site**	Group A	Prof. dr. sc. Hrvoje Jakovac, dr. med.
26. 01. 2023. Lect 23 (13,00-14,30)	**Disorders of parathyroid glands function. Disorders of calcium, phosphate and magnesium metabolism.**	**On-site**	Group A	Prof. dr. sc. Hrvoje Jakovac, dr. med.
26. 01. 2023. Sem 20 (14,45-17,00)	**Disorders of neurovegetative regulation. Disorders of consciousness.**	**On-site**	Group A	Benjamin Palić, dr. med.
27. 01. 2023. (13,00-14,00)	**Midterm exam II**	**On-site**	Group A	Prof. dr. sc. Hrvoje Jakovac Doc. dr. Slavica Ćorić Mr. sc. Borko Rajić Mr. sc. Marija Šandrk, dr. med. Ivana Bjelanović, dr. med. Benjamin Palić, dr. med.